

The Green Lacewings (Neuroptera: Chrysopidae) of Brazilian Agro-ecosystems

by

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Eighty-one species of Chrysopidae in six genera and two subgenera are described from Brazilian agricultural systems. Forty-one of these are new species. They are: *Nacarina aculeata* de Freitas and Penny (type locality: Birigui, São Paulo, Brazil); *N. gladius* de Freitas and Penny (type locality: Birigui, São Paulo, Brazil); *N. lavrasana* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *N. sagitta* de Freitas and Penny (type locality: Ibitinga, São Paulo, Brazil); *Ceraeochrysa dislepis* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *C. dolichosvela* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *C. squama* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *Chrysoperla raimundoi* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *Chrysopodes (Chrysopodes) adynatos* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *C. (C.) copia* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *C. (C.) crocinus* de Freitas and Penny (type locality: Birigui, São Paulo, Brazil); *C. (C.) delicata* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *C. (C.) elongata* de Freitas and Penny (type locality: Luis Antonio, São Paulo, Brazil); *C. (C.) nigropicta* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *C. (Neosuarius) karinae* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *Plesiochrysa alytos* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *Leucochrysa (Leucochrysa) bruneola* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *L. (L.) catarinae* de Freitas and Penny (type locality: Fraiburgo, Santa Catarina, Brazil); *L. (Nodita) affinis* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *L. (N.) barrei* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *L. (N.) confusa* de Freitas and Penny (type locality: Fraiburgo, Santa Catarina, Brazil); *L. (N.) cornuta* de Freitas and Penny (type locality: Guaira, São Paulo, Brazil); *L. (N.) forciformis* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *L. (N.) furcata* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *L. (N.) guataparensis* de Freitas and Penny (type locality: Luis Antonio, São Paulo, Brazil); *L. (N.) ictericus* de Freitas and Penny (type locality: Birigui, São Paulo, Brazil); *L. (N.) incognita* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); *L. (N.) interata* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *L. (N.) lineata* de Freitas and Penny (type locality: Luis Antonio, São Paulo, Brazil); *L. (N.) maculata* de Freitas and Penny (type locality: Taquaritinga, São Paulo, Brazil); *L. (N.) michelini* de Freitas and Penny (Jaboticabal, São Paulo, Brazil); *L. (N.) parallela* de Freitas and Penny (type locality: Jaboticabal, São Paulo, Brazil); *L. (N.) retusa* de Freitas and Penny (type locality: Balsamo, São Paulo, Brazil); *L. (N.) robusta* de Freitas and Penny (type locality: Itiquira, São Paulo, Brazil); *L. (N.) santini* de Freitas

(type locality: Jaboticabal, São Paulo, Brazil); *L. (N.) scomparini* de Freitas and Penny (type locality: Itiquira, São Paulo, Brazil); *L. (N.) squamiseta* de Freitas and Penny (type locality: Birigui, São Paulo, Brazil); *L. (N.) tabacinus* de Freitas and Penny (type locality: Itiquira, São Paulo, Brazil); *L. (N.) tenuis* de Freitas and Penny (type locality: Luis Antonio, São Paulo, Brazil); *L. (N.) vignisi* de Freitas and Penny (type locality: Itiquira, Mato Grosso, Brazil); and *L. (N.) vittata* de Freitas and Penny (type locality: Ribeirão Preto, São Paulo, Brazil). Information about crops on which these species were collected is given when known.

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Brazilian agricultural production is among the largest and most diverse in the world, generating about \$777 billion annually in foodstuffs and fiber and accounting for 8% of total gross domestic product (Ministério de Agricultura, 1999). Agriculture is also the largest source of export revenues for the country, producing \$11.788 billion annually, or 24.55% of all export products (idem). For example, Brazil is the largest producer of coffee, orange juice, and sugar in the world, and is second only to the United States in soybean production. It has been said that the weather in São Paulo will materially affect futures markets in Chicago and New York for such commodities as soybeans, coffee, and orange juice. A more colorful way of phrasing this interdependence is that when a farmer sneezes in São Paulo, a trader in Chicago catches a cold.

To protect these crops against pest damage a variety of strategies have evolved. As in North America, there is a growing desire to rely less on pesticides and increase use of natural predators and parasites. Two components of natural predator protection are inundative releases and oviposition augmentation. However, in order for either of these strategies to be successful it is necessary for researchers to know what species of predators and parasites can exist in these ecosystems and how they interact with each other. A first step in this direction is to document the species of predators and parasites which naturally coexist with pests in the fields, orchards, and plantations.

In the United States, the most frequently utilized natural predators for inundative release programs are members of the green lacewing genus *Chrysoperla* (M. J. Tauber et al. 2000), which as



PLATE A. Adult *Ceraeochrysa cincta* on sorghum. B. Adult *Ceraeochrysa caligata* on rubber tree leaf. C. Adult *Ceraeochrysa caligata* on rubber tree leaf. D. Third instar of *Chrysoperla externa* feeding on aphids.

adults feed on grass pollen and naturally occur most frequently in grasslands. Other green lacewings are more frequently found in orchards (*Ceraeochrysa* spp.) and forests (*Leucochrysa* spp.).

Green lacewings often are voracious and aggressive predators as larvae, being quite effective in feeding on phytophagous insects under ideal conditions. Neumark (1952) found that female *Chrysoperla carnea* (Stephens) in Israel will lay up to 679 eggs. Smith (1921, 1922) counted up to 617 eggs per female of *Chrysopa oculata* Say in North America. Withycombe (1923) recorded larval *Chrysoperla* and *Chrysopa* in Europe feed on an average of about 100 aphids during their development, while Matsuda (1928) recorded as many as 900 aphids or 3,780 scale insects for each larva of Japanese species. Neumark (1952) fed *Chrysoperla carnea* 6,487 scale insect eggs during the 14 day cycle of its larval development. Larval green lacewings are known to feed on adult aphids (Aphidoidea), scale insects (Coccoidea), mealy-bugs (Pseudococcidae), saw-fly larvae (Diprionidae), mites (Acari), Lepidoptera larvae and eggs, syrphid fly larvae (Syrphidae), dusky-wing larvae (Coniopterygidae), thrips (Thysanoptera), and small Coleoptera larvae. However, although known as general predators, there often is a strong link between host plant and associated species of green lacewing indicating a more specific association with prey items than is generally believed.

Brazil produces a tremendous number of crops in many different vegetation structures from open fields of graminaceous crops (barley, maize, oats, wheat) to vines (grapes, guarana), to tree crops (oranges, coffee, cacão), to selective harvesting of forest products (rubber, cupuaçu). These crops often contain a rich assemblage of chrysopid species, some of which have never been formally described. Previous studies have almost always listed chrysopids as *Chrysopa* sp., a genus which is now restricted to the Northern Hemisphere. Because of the rapidly evolving state of chrysopid taxonomy, all previous identifications must be treated with a great deal of caution. Formal names and descriptions are herein provided to facilitate studies of species biologies, interactions, and the role each species plays in protecting these food plants. This monograph is primarily intended for use by taxonomists attempting to identify species collected in these agricultural systems. Other crop protection specialists may be able to identify the included species, but this should be done with caution. The male and female genitalic sclerites and membranes illustrated herein are tiny (often much less than one mm in length) and require careful dissection and staining to observe clearly. A considerable amount of experience is needed to confidently recognize these structures properly.

MATERIALS AND METHODS

For this study 579 adults were collected by the senior author and his students on nine crops from 35 different localities in seven different states using several different methods throughout the year. These methods included sweep net sampling, lights, flight intercept traps (Malaise traps), and Molasses traps. Molasses traps were small plastic water bottles suspended from trees. Each bottle had a 10% molasses solution inside and two 2 cm holes cut in the sides of the bottle. Chrysopids would enter through the holes and could not find their way back out. While the number of crops and number of localities collected during this study was not comprehensive, in a country the size of Brazil the number of potential crops and collecting localities is enormous. It was felt that enough information had accumulated that this monograph was warranted. Certainly, future collecting on additional crops and in additional localities will reveal further information about these and perhaps other species.

Many specimens were pinned and others were preserved in 75% ethyl alcohol. To study the wings, they were detached from the body and mounted dry on microscope slides. Abdomens were detached, macerated in warm 10% KOH, then stained with Chlorazol Black E. After study, wings were glued to a small card on the pin below the specimen and abdomens were placed in small vials of glycerin below each specimen. Drawings were made using dissecting and compound microscopes with camera lucida attachments. Inked drawings were then scanned, using Adobe Photoshop, and arranged into composite plates.

This study relies much more heavily on elements of the female genitalia than most previous studies. We have found that the form of the spermatheca (vela and ventral impression), spermathecal ducts, subgenitale and surrounding area are much more diverse and reliable for species recognition than previously thought.

Types of designated new species will be deposited in the Museu de Zoologia/USP, São Paulo, SP, Brazil. Other material examined specifically for this study is deposited in the Sergio de Freitas Collection, Departamento de Fitossanidade, Universidade Estadual Paulista, Jaboticabal, São Paulo (SDF), unless specifically indicated as deposited at California Academy of Sciences (CAS), San Francisco, California, U.S.A.

CROP ASSOCIATIONS

Specimens were collected and examined from the following crops: rubber, orange, corn (maize), guava, apple, cotton, cashew nut, cantaloupe and eucalyptus.

The insects collected in rubber tree (*Hevea brasiliensis*) plantations were identified as members of 42 species in 4 genera, as follows: *Leucochrysa* (*Leucochrysa*) *ampla*, L. (L.) *pretiosa*, L. (L.) *varia*, L. (L.) *bruneolus*; L. (*Nodita*) *affinis*, L. (N.) *camposi*, L. (N.) *cruentata*, L. (N.) *heriocles*, L. (N.) *lancala*, L. (N.) *lateralis*, L. (N.) *marginalis*, L. (N.) *marquezi*, L. (N.) *melanocera*, L. (N.) *rodriguezi*, L. (N.) *barrei*, L. (N.) *forciformis*, L. (N.) *furcata*, L. (N.) *guataporensis*, L. (N.) *ictericus*, L. (N.) *incognita*, L. (N.) *interata*, L. (N.) *retusa*, L. (N.) *robusta*, L. (N.) *scomparini*, L. (N.) *tabacinus*, L. (N.) *vignisi*; *Ceraeochrysa* *cincta*, *C. caligata*, *C. claveri*, *C. cubana*, *C. everes*, *C. sanchezi*, *C. tenuicornis*, *C. pennyi*; *Plesiochrysa* *elongata*, *P. alytos*; *Chrysopodes* *adynatus*, *C. delicata*, *C. nigropicta*, *C. polygonica*; *Chrysoperla* *externa*, and *C. defreitasi*.

In orange groves (*Citrus sinensis*) the following species were encountered: *Leucochrysa* (N.) *camposi*, L. (N.) *clepsydra*, L. (N.) *cruentata*, L. (N.) *walkerina*, L. (N.) *lancala*, L. (N.) *rodriguezi*, L. (N.) *affinis*, L. (N.) *ictericus*, L. (N.) *maculata*, L. (N.) *melanocera*, L. (N.) *vittata*; *Chrysopodes* *lineafrons*, *C. polygonica*, *C. spinella*, *C. divisa*; *Nacarina* *pletorica*, *N. lavrasana*; *Plesiochrysa* *brasiliensis*; *Ceraeochrysa* *cincta*, *C. caligata*, *C. claveri*, *C. cubana*, *C. dolichosvela*, *C. everes*, *C. paraguaria*, *C. sanchezi*, *C. scapularis*, *C. tucumana*, *C. citrinus*, *C. pennyi*, *Chrysoperla* *externa*, and *C. raimundoi*.

In corn fields (*Zea mays*) the following were found: L. (N.) *lancala*, L. (N.) *cornuta*, L. (N.) *ictericus*, L. (N.) *rodriguezi*, L. (N.) *squamisetosa*; *Chrysopodes* *indentata*, *C. crocinus*; *Nacarina* *panchlora*, *N. aculeata*, *N. sagitta*, *N. gladius*; *Plesiochrysa* *brasiliensis*, *P. elongata*, *P. alytos*; *Ceraeochrysa* *cincta*, *C. claveri*, *C. cubana*, *C. everes*; and *Chrysoperla* *externa*.

Guava (*Psidium guajava*) yielded the following species: L. (N.) *camposi*, L. (N.) *cruentata*; *Chrysopodes* *lineafrons*, *C. karinae*; *Plesiochrysa* *brasiliensis*, *P. alytos*; *Ceraeochrysa* *cincta*, *C. claveri*, *C. cubana*, *C. everes*, *C. montouana*, *C. paraguaria*, *C. sanchezi*, *C. squamma*; *Chrysoperla* *externa*, and *C. raimundoi*.

The following species were found in apple (*Malus pumila*) orchards: *Leucochrysa* (L.) *boxi*, L. (L.) *catarinae*, L. (N.) *intermedia*, L. (N.) *confusa*; and *Chrysoperla* *externa*.

Cotton (*Gossypium* spp.) fields yielded the following species: *Leucochrysa* (N.) *interata*, L. (N.) *parallela*; *Ceraeochrysa* *cincta*, *C. cubana*; and *Chrysoperla* *externa*.

In cashew nut (*Anacardium occidentale*) plantations the following species were found: *Leucochrysa* (N.) *rodriguezi* and *Chrysoperla* *externa*.

The following species were found in cantaloupe (*Cucumis melo*) fields: *Ceraeochrysa* *sanchezi* and *Chrysoperla* *externa*.

Eucalyptus plantations contained the following species: *Leucocrysa* (N.) *aurantiacus*, L. (N.) *guataporensis*, L. (N.) *lineata*, L. (N.) *robusta*, L. (N.) *santini*, L. (N.) *tenuis*; *Chrysopodes* *divisa*, *C. elongata*; *Ceraeochrysa* *cubana*, *C. pennyi*, *C. scapularis*; and *Chrysoperla* *externa*.

SYSTEMATIC TREATMENT

The identification of Neotropical Chrysopidae is difficult. Of the 489 species described from the New World south of the U.S.A. border, 290 of them were described by Padre Longinos Navás during the first third of the 20th century (Penny 1978). His descriptions were brief, often not diagnostic, and usually not accompanied by useful illustrations. To complicate matters, he sometimes placed type material in his private collection, much of which has subsequently been destroyed. To understand the species he described, it is necessary to visit many of the European museums where types exist, as well as study the remnants of the Navás collection. The late Phillip A. Adams studied almost all of Navás' remaining types, frequently macerated and stained the abdomens, took notes, and made pencil sketches of male and female genitalia. These notes and sketches are now in the Entomology Department of the California Academy of Sciences and have proven invaluable in the preparation of this manuscript. In the individual species descriptions of this monograph, where no indication is given that types have been studied, the species have been identified using Adams' notes and sketches of the type specimens. Additionally, in 1992 the junior author received an Ernst Mayr grant from the Museum of Comparative Zoology to study Banks and Schneider types at that museum. A set of specimens from the California Academy of Sciences was compared with types at Harvard University at that time and has provided valuable comparative material. Less detailed studies have been made by the junior author of some Navás types in the British Museum (Natural History) (London) and Muséum national d'Histoire Naturelle (Paris) but have not been included in the material examined section of species descriptions.

Three publications have also been exceptionally useful for interpretation of the Neotropical chrysopid fauna. Adams and Penny (1987) covered not only part of the region under consideration, but also one of the two main tribes involved in the present study. This paper provides keys to all species and includes known synonymy. Adams (1982a) described one of the major genera under discussion and listed the 27 species known at that time, along with considerable synonymy. Finally, Brooks and Barnard (1990) have provided a modern generic framework for many disparate species previously placed together in the genus "*Chrysopa*."

The most problematic group remains *Leucochrysa* (*Nodita*). This subgenus contains over 200 described species, and no modern treatments of the individual species exist. Thus, we have relied almost exclusively on the type specimens that we have seen and Phillip Adams' notes and drawings for species identification. The key included here is the first key of any *Leucochrysa* (*Nodita*) species in more than 55 years.

We are following the classification and terminology used by Brooks and Barnard (1990) in their world generic revision of Chrysopidae. We have included all species that we have found in agricultural production areas, but have not intended this to be a complete treatment of all green lacewings found in Brazil. Numerous other species are to be found in natural ecosystems and these probably occasionally will stray into the more disturbed agricultural ecosystems. We hope eventually to publish monographic revisions for the different tribes and genera of the Neotropics, but we intend this treatment to be used for the specific habitat types indicated until more comprehensive studies can be completed. For the Amazonian region, a systematic treatment of Chrysopini is available (Adams and Penny 1987).

Since we are relying so strongly on elements of the male and female terminalia for identification, a few words of explanation of these structures are merited. A full complement of sclerites at the apex of the male abdomen would include: a small quadrate sclerite directly below the anus (subanal plate), followed in order by a thin arched structure (tignum) usually with a small medial projection (acumen); an arched structure (gonarcus) with broadened apices (lateral arms), sometimes with a dorsal plate (dorsal hood), a pair of dorsally projecting lobes (gonocornua), or caudo-ventrally projecting lobes (entoprocesses) which partially wrap laterally around a membranous apical sac (gonosaccus); the

gonarcus usually has a caudally projecting medial lobe (mediuncus) which ends in medial point (arcessus) which often is tripartite and decurved; below (and not connected to) the gonarcus and above the gonosaccus there may be a long medial sclerite (pseudopenis); the gonosaccus often bears setae (gonosetae) or small toothed plates (gonocristae) on its surface; lateral to the gonosaccus in Belonopterygini there may be an elongate, pointed sclerite (paramere); finally, there may be a sclerite above the fused eighth and ninth sternite (gonapsis), which in New World species takes the form of a long rod. All elements of the male genitalia are never present, and the combination of presence or absence of these components is the best available criterion for generic recognition.

Female genital elements include a spermatheca consisting of heavily sclerotized vela with a ventral impression at its anterior end and connected near the mouth of this impression is a long duct (spermathecal duct) ending in an appendix-like projection which is often hairy (see Fig. 30). At the posterior end of the vela is a constricted and less sclerotized duct (bursal duct) which connects to an expanded, membranous copulatory bursa. Two membranous accessory glands (bursal glands) empty into the bursa. Above the bursa is a second set of membranous accessory glands (colleterial glands), which terminate separately between the lobes of the lateral gonapophyses. On the body surface below the lateral gonapophyses and above the seventh sternite is a sclerite (subgenitale) with paired dorsal lobes and ventromedial lobe. In the Belonopterygini, the subgenitale can be protracted by an elongate, membranous stalk. The ventromedial lobe may be quite small, or occasionally quite elongate. Often, in the middle of this ventral lobe is a small, more heavily sclerotized indentation (crumena). In Belonopterygini at the caudal apex of the seventh sternite there is a small medial sclerite (praegenitale) with a central crumena. This probably reflects a migration and separation of the apex of the subgenitale ventromedial lobe.

At present all known green lacewings found in agro-ecosystems in Brazil belong to three tribes, all in the subfamily Chrysopinae. Adults can be distinguished using the following key.

KEY TO THE TRIBES OF CHRYSOPIDAE FOUND IN BRAZILIAN AGRO-ECOSYSTEMS

- 1. Adults thick-bodied with prothorax wider than long (Fig. 1A); antennomeres wider than long beyond the first few basal segments; larvae associated with ant nests Belonopterygini
- 1'. Adults thinner-bodied with prothorax usually as long as wide (Fig. 9A); antennomeres longer than wide beyond the first few basal segments; larvae free-living on vegetation, often with bodies covered with debris and skins of prey 2
- 2. Forewings bearing dark spot at base of pterostigma; outer gradate series of crossveins at narrow angle (less than 45°) to pseudomedial vein (Fig. 41B); antennae longer than wings Leucochrysiini
- 2'. Forewing pterostigmal area completely pale; outer gradate series of crossveins at broad angle (greater than 60°) to pseudomedial vein (Fig. 37B); antennae shorter than wings Chrysopini

TRIBE BELONOPTERYGINI NAVÁS, 1913a

These green lacewings, when first seen, are remarkably robust. They are wider bodied than other chrysopids. The pronotum is always wider than long and antennal segments are wider than long (Adams and Penny 1987). However, the species found in Brazil are among the least robust of the tribe and some species can be confused with members of Chrysopini. Other species in the region, however, are large and thick-bodied. We have seen some females from Rio Doce in Minas Gerais that are so big that they can momentarily appear similar to some of the large, yellow megalopterans of the genus *Chloronia*.

The tribe is worldwide in distribution. Most of the Old World species are in the genus *Italochrysa* (Tjeder 1966). The dominant New World genus is *Nacarina* and all known Brazilian species are in this genus. There are two additional New World genera (Adams 1978): *Belonopteryx* is a monotypic genus with long, narrow wings known from only three specimens from Argentina; and *Abachrysa* is a

genus with dark wings and dark maculations on the wings found in southeastern U.S.A. and the Caribbean (Brooks and Barnard 1990).

All known species of Belonopterygini are ant nest associates as larvae (Brooks and Barnard 1990). Their main contribution to agricultural ecosystems is probably to reduce the numbers of certain species of ants in the fields. Their more frequent occurrence in corn fields may be an indication of preference for ants living in a more open habitat.

Genus *Nacarina* Navás, 1915

Brooks and Barnard (1990) reported 14 species of *Nacarina*, all restricted to the New World with 11 of them found in South America. During this study, three of the 11 South American species were seen, as well as four undescribed species. Adults can be distinguished using the following key.

KEY TO THE SPECIES OF *NACARINA* FOUND IN BRAZILIAN AGRO-ECOSYSTEMS

1. Apical segment of maxillary palps swollen, bulbous (Fig. 1D) 2
- 1'. Apical segment of maxillary palps tubular, apically tapering (Fig. 3A) 3
2. Head and pronotum completely pale, without markings (Fig. 2A) *N. pletorica*
- 2'. Vertex and gena with red marks; pronotum with lateral red stripe (Fig. 1A) *N. panchlora*
3. Head without dark markings; lateral arms of gonarcus with funnel-shaped cavity (Fig. 7C) *N. sagitta*
- 3'. Head with some dark markings (Fig. 5A); lateral arms of gonarcus without cavity (Fig. 4F) 4
4. Forewing inner and outer gradate veins parallel (Fig. 5B) 5
- 4'. Forewing inner and outer gradate veins divergent (Fig. 3B) *N. wagneri*
5. No red markings on central raised area of vertex (Fig. 4A); parameres adherent to gonosaccus (Fig. 4G); gonosaccus with numerous, small gonocristae (Fig. 4F, G) *N. aculeata*
- 5'. Two crescent-shaped red marks on raised central area of vertex (Fig. 5A); parameres adjacent to gonosaccus (Fig. 5F); gonosaccus with few long setae, no small gonocristae (Fig. 5F) 6
6. Intramedian cell quadrate (Fig. 6B); gena red; maxillary palps pale (Fig. 6C); inner margins of gonocornua form V-shaped (Fig. 6H) *N. lavrasana*
- 6'. Intramedian cell triangular (Fig. 5B); gena pale; maxillary palps dark (Fig. 5C); inner margins of gonocornua form U-shaped (Fig. 5E) *N. gladius*

Nacarina panchlora (Gerstaecker, 1888)

DIAGNOSIS. — This is one of two species with bulbous maxillary and labial palpi, short faces, and broad bodies. There also appears to be the beginnings of a second intramedial cell. *Nacarina panchlora* has much more red coloration on gena and pronotum than *N. pletorica*. The lateral digitiform lobes of the female genitalia also appear distinctive. So far, we have only found this species associated with corn fields.

HEAD. — Yellow and green. Vertex yellow, rugose, posteriorly elevated; two small, red postocular spots at hind margin. Frons yellow with red marks below antennal bases. Clypeus and labrum green. Gena red (Fig. 1C). Maxillary and labial palpi pale, last segment basally bulbous, apically rounded (Fig. 1D). Antenna pale, first segment of flagellum larger than others.

THORAX. — Green with yellow mid-line. Pronotum twice as wide as long; anterior margin arched; brown stripes laterally (Fig. 1B). Meso- and metanotum unmarked. Tarsal claws elongate without basal expansion. **Wings:** Forewing green, with anterior endings of Radius (R)-Radial Sector (Rs) and gradate veins dark. Subcosta (Sc) and Rs veins swollen. Intramedian cell (imc) quadrangular. Incomplete second intramedian cell. Partial third gradate series present (Fig. 1B). Forewing length (2.55 cm): width (0.92 cm) = ratio (2.77). Hindwing length (2.28 cm): width (0.82 cm) = ratio (2.78).

ABDOMEN. — Green with yellow mid-line. **Female:** Subgenitale with central projection (Fig. 1G). Spermatheca short, membranous posterior part folded upon itself. Bursa copulatrix acute anteriorly, with pair of accessory glands (Fig. 1E). Lateral to subgenitale a membranous lobe with two flat pockets (Fig. 1F).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Birigui, 6 April 1996, Scomparin, C. H. J. (1♀)(corn); 3 September 1996, Scomparin, C. H. J. (1♀)(corn); Jaboticabal, 11 August 1991, Scomparin, C. H. J. (1♀)(corn); Franca, 19 October 1994, Montovani, R.C. (1♀)(corn).

Nacarina pletorica (Navás, 1919)

DIAGNOSIS. — This is one of two species with quite broad bodies, short faces, and bulbous apices of palps. *Nacarina pletorica* can be separated from *N. panchlora* by the lack of genal and pronotal red coloration and somewhat narrower wings, without partial third gradate series.

HEAD. — Pale yellow. Gena, clypeus, labrum, frons, vertex and antenna pale, without marks. Face short (Fig. 2D). Maxillary and labial palpi pale, last segment large, bulbous, tapered to rounded apex (Fig. 2C). Vertex rugose and raised posteriorly.

THORAX. — Pale yellow, unmarked. **Wings:** Venation pale, except anterior intersections of first costal crossveins, basal subcostal crossvein, posterior endings of first R-Rs crossveins, gradates, ends of Pseudomedius (Psm)-Pseudocubitus (Psc) crossveins, and apex of anal veins brown (Fig. 2B). Imc quadrate. Pterostigma pale, unmarked. Rs, Psm and Psc swollen. Forewing slender; length (17.8 mm): width (0.56 cm) = ratio (3.18). Hindwing green, except anterior ending of first costal crossveins, posterior endings of first Rs-Psm crossveins, gradates, endings of Psm-Psc crossveins, and endings of anal veins pale brown (Fig. 2B). Gradates, Psm, and Psc swollen. Hindwing slender, length (1.6 cm), width (0.5 cm) = ratio (3.14).

ABDOMEN. — Yellow, unmarked. Ectoproct ventro-posterior angle tapering to sclerotized point. Setae of callus cerci angled medially. **Male genitalia:** Eighth and ninth sternites fused; ninth smaller than eighth and strongly tapered to apex; microtholi present (Fig. 2E). Gonarcus short and broad; lateral arms short, with lateral lobe. Gonocornua plate-like with two apical lobes, the inner acute. Arcessus short, apical lobe with medial hook flanked by short, rounded, lateral lobes. Gonosaccus with many long setae (Fig. 2F, G).

MATERIAL EXAMINED. — **BRAZIL: São Paulo:** Jaboticabal, 18 December 1995, Franco, E. (1♂).

REMARKS. — The male specimen that we have available appears to have somewhat aberrant wing venation in that the forewing has a second intramedial vein.

Nacarina wagneri Navás, 1924a

DIAGNOSIS. — Characterization was made from a faded, pinned specimen. This species is a member of a species group having elongate, tubular, apical palp segments. The quadrate intramedian cell separates *N. wagneri* from *N. aculeata* and *N. gladius*. The red head and pronotal markings separate *N. wagneri* and *N. lavrasana* from *N. sagitta*, while the concave curvature of the inner gradates separates *N. wagneri* from *N. lavrasana*.

HEAD. — Antennae pale. Red mark around antennal bases. Maxillary and labial palpi pale, last palpmere slender, tapered and not inflated (Fig. 3A).

THORAX. — Pronotum twice as wide as long, with lateral red stripe. Mesonotum with lateral red stripe. **Wings:** Forewing length (1.95 cm): width (0.69 cm) = ratio (2.83). Venation completely pale. Intramedian cell quadrangular (Fig. 3B). Hindwing length (1.67 cm): width (0.60 cm) = ratio (2.78).

ABDOMEN. — Pale. **Female:** Seventh sternite with apical knob (Fig. 3C). Spermatheca a large chamber and several convoluted coils (Fig. 3E); accessory glands with huge sac which extends anteriorly to sixth segment (Fig. 3F). Subgenitale with medial projection with ventral cremena (Fig. 3D).

MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Salabra, March 1940, collector unknown.

Nacarina aculeata de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museum de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled: "Birigui, SP, Fz. São Joaquim, 11/Jun/94, Scomparin, C. H. J., SP66" (on corn).

DIAGNOSIS. — This is a member of a species group having tubular, tapering palps. It has ovate intramedian cell and dark palpi, which separates it from all other species, except *N. gladius*. *Nacarina aculeata* can be separated from *N. gladius* by the shorter face, lack of red markings on the vertex, shorter inner gradate series of the hindwing, shorter setae on ectoproct and sternite 8 + 9, shape and longer length of the parameres, and spiny apex and dorsal margin of sternite 8 + 9.

The name "aculeata" comes from the Latin *aculeatus* meaning sharp-pointed. This name refers to the field of spines along lateral margin of sternite 8 + 9 and the teeth at the apex of this sternite.

HEAD. — Golden yellow. Vertex, frons and clypeus glabrous. Face short. Gena pale, unmarked. Vertex deeply depressed laterally near eye margin. Scape and pedicel with dorsal brownish red stripes; basal segments of flagellum black striped on inner surface (Fig. 4A), more distal segments fuscous, with setae black. Maxillary and labial palpi with black markings; last segment tapered and slender. (Fig. 4C).

THORAX. — Yellow. Pronotum glabrous with lateral pale reddish brown stripe (Fig. 4A). **Wing:** Venation pale, except R-Rs crossveins, Rs-Psm crossveins, Rs-inner gradate (Ig) crossveins, gradates, Psm-Psc crossveins, marginal forked and unforked veins dark. Pterostigma unmarked. Forewing length (1.6 cm): width (0.52 cm) = ratio (3.08). Intramedian cell triangular. Hindwing venation pale except costal crossveins, R-Rs transverse vein endings and gradates dark. Length (1.38 cm): width (0.43 cm) = ratio (3.2) (Fig. 4B).

ABDOMEN. — **Male:** Densely covered by short and pale setae (Fig. 4D). Sternite 7 much larger than sternite 8 + 9. Apex of ectoproct rounded (Fig. 4D). Sclerotized melanic band at anterior margin of ectoproct with branch leading downward to melanic callus cerci, unlike the pale apodemes found in all other species. Apex of sternite 8 + 9 with several heavily sclerotized teeth; subapical dorsal margin of sternite with spiny lobe (Fig. 4E); without microtholi. Arcessus short, broad with dorso-medial projection terminating in decurved hook flanked by two rounded lobes (Fig. 4F, G, H). Lateral arms of gonarcus with postero-ventral portion extending below arcessus. Gonosaccus with few long setae; ventral portion with field of numerous small gonocristae. Parameres parallel curved rods adherent to gonosaccus (Fig. 4F).

MATERIAL EXAMINED. — Known only from the holotype.

Nacarina gladius de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled: "Birigui, SP, 6 April 1996, Scomparin, C. H. J." (on corn).

DIAGNOSIS. — This is a member of a species group having tubular, apically tapered palps and a triangular intramedian cell. It can be separated from *N. aculeata* by the presence of a double crescent red mark on the vertex, much longer inner gradate series of the hindwing and characteristics of the male genitalia such as a more narrow arcessus, lack of spines on sternite 8 + 9 and lack of gonocristae on the gonosaccus in *N. gladius*.

The name "gladius" comes from the Latin word for sword, and refers to the shape of the parameres.

HEAD. — Golden yellow. Vertex raised, rugose, with red double crescent marking. Scape and pedicel with wide dorsal red stripe (Fig. 5A); first 37 flagellomeres with black stripe along medial margin; more apical segments fuscous. Frons with red spot below antennal base and above anterior tentorial pit. Gena black-banded near frons. Maxillary and labial palpi pale, apical segment tubular, apically tapering (Fig. 5C).

THORAX. — Yellowish green. Pronotum with short and slender brown stripe at anterior angle; posterior angle weakly red spotted. Meso- and metanota without markings (Fig. 5A). **Wings:** Venation green, except costal crossveins, R-Rs crossveins and gradates dark (Fig. 5B). Pterostigma pale, unmarked. Forewing length (2.23 cm): width (0.69 cm) = ratio (3.23). Hindwing length (1.8 cm): width (0.6 cm) = ratio (3.0). Venation green, except middle costal crossveins dark.

ABDOMEN. — Green without marks. Ectoproct dorso-apical angle acute. Sternite 8 + 9 evenly tapered, triangular; suture not visible, no microtholi (Fig. 5D). Gonarcus not vertically arched; lateral arms ovate. Bases of gonocornua proximal to each other; inner margins U-shaped. Arcessus short, narrow; with medial decurved hook and tiny rounded lateral lobes. Gonosaccus with few long gonosetae. Parameres long, sword-shaped, conical, adherent to gonosaccus.

MATERIAL EXAMINED. — Known only from the holotype.

Nacarina lavrasana de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Jaboticabal, SP; Abril/93, Murtati, G."

DIAGNOSIS. — This species can be separated from other South American species by the tubular, apically tapered maxillary palpi and quadrangular intramedian cell. The only other species of *Nacarina* in the region with these characteristics is *N. sagitta*, which has no red markings on head and thorax. The male genitalia are also quite different, with the gonocornua of *N. lavrasana* much more approximated basally and much shorter, and not having dorsal pockets of the lateral arms of the gonarcus. This species also resembles *N. cordillera* from northern South America and Central America, but that species has the apex of male sternite 8 + 9 bluntly truncated.

The name of this species is derived from the town of Lavras in Minas Gerais State.

HEAD. — Yellow, marked with red. Vertex glabrous with red, double crescent-shaped marks (Fig. 6A). Scape and pedicel with narrow red stripe dorsally; flagellum with medial dark stripe on basal flagellomeres and completely brown apical ones. Gena with red spot bordering frons (Fig. 6C). Maxillary and labial palpi pale, last segment slender and narrow, apically tapered (Fig. 6D).

THORAX. — Green. Pronotum with red lateral stripe. Meso- and metanota green without marks. **Wings:** Venation green, except posterior endings of R-Rs crossveins and gradates of forewing dark. Transverse vein between first and second median cells inflated (Fig. 6B). Forewing length (2.28 cm): width (0.74 cm) = ratio (3.08). Hindwing length (2.02 cm): width (0.65 cm) = ratio (3.1).

ABDOMEN. — Green without markings. No microtholi. **Male genitalia:** Gonarcus arcuate, thick. Bases of gonocornu proximal, apically decurved. Arcessus long, with small, rounded lateral lobes and medial decurved hook. Cluster of setae on gonosaccus below gonocornu. Paramere slender, adherent to gonosaccus (Fig. 6H, I). **Female genitalia:** Spermatheca short, extended as long wrinkled expansion to bursa copulatrix. Spermathecal duct short, coiled. Two sets of colleterial glands long and filamentous, extended to fifth segment (Fig. 6E, G). Subgenitale heavily-sclerotized, extended anteriorly as sclerotized medial lobe (Fig. 6F).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** São João da Boa Vista, 12 October 1994, Mello, S. R. C. (1 ♀ paratype)(orange); Jaboticabal, April 1993, Murtati, G. (1 ♀ paratype); **Minas Gerais:** Lavras, 10 October 1990, Carvalho, C. F.

Nacarina sagitta de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Ibitinga, SP; 19-12-88, Maia, A. M.”

DIAGNOSIS. — This species is a member of the group having slender, tapering pale palpi and sharply tapered male sternite 8 + 9. It is close to *Nacarina gladius*, but can be differentiated by a suite of characteristics: *N. gladius* has a triangular intramedian cell; gonarcus less vertically arched; bases of gonocornua more closely approximated, lateral arms of gonarcus not inflated with internal pocket.

The name “sagitta” comes from the Latin word for arrow, and refers to the shape of the male parameres.

HEAD. — Vertex, frons, clypeus, labrum and gena pale yellow. Antenna pale, unmarked.

THORAX. — Yellow. Pro-, meso- and metanota unmarked. **Wings:** Wing apex missing. Transverse vein between first and second median cells and contiguous parts of Psc swollen. Intramedian cell quadrangular (Fig. 7B).

ABDOMEN. — Apex of ectoproct truncate. **Male genitalia:** Dorsal apodeme of ectoproct forked near base; ventral fork continues ventrally below ectoproct and terminates acutely (Fig. 7A). Sternite 8 + 9 partially fused with visible suture; microtholi present (Fig. 7A). Medial arch of gonarcus short and strongly curved; lateral arms swollen with inner pocket which opens dorsally (Fig. 7C). Gonocornua slender, with bases well separated. Arcessus elongate; apical lateral lobes as vertically oriented plates and medial decurved hook. Group of little lobes below arcessus and laterad of gonosaccus with long setae. Large, sclerotized, conical, apically arrowhead-shaped parameres extend to arcessus (Fig. 7C, D).

MATERIAL EXAMINED. — Known only from the holotype.

TRIBE CHRYSOPINI SCHNEIDER, 1851

Chrysopini are the green lacewings most often seen in fields and on windows and store fronts at night. Adults of some species, such as those in the Holarctic genus *Chrysopa*, can emit a foul-smelling odor in self-defense. Adults of Chrysopini are small to medium-sized (8–20 mm forewing length) and basically green in color with four similar transparent wings. Larvae of some genera, such as *Chrysoperla*, have naked larvae, while larvae of other genera, such as *Ceraeochrysa*, cover their bodies with debris and dried bodies of prey. As a group, they are indigenous to all temperate and tropical parts of the world, except New Zealand.

Adult Chrysopini are morphologically conservative, so that the generic classification is based primarily on sclerotized elements of the male genitalia. Adults of genera of Brazilian Chrysopini can be distinguished using the following key:

KEY TO MALES OF CHRYSOPINI GENERA FOUND IN BRAZILIAN AGRO-ECOSYSTEMS
(modified from Adams and Penny 1987)

- 1. Tignum present (Fig. 25E) 2
- 1'. Tignum absent (Fig. 31B) 3
- 2. Pseudopenis present; pronotum with four red spots or lateral stripes (Fig. 37A, H) *Plesiochrysa*
- 2'. Pseudopenis absent; pronotum without red marks (Fig. 24A, I) *Chrysoperla*
- 3. Gonapsis elongate (Fig. 8C); two hornlike structures on gonarcus or arcessus (Fig. 9E) *Ceraeochrysa*
- 3'. Gonapsis absent (Fig. 31B); hornlike structures absent from gonarcus-arcessus (Fig. 31E) 4
- 4. Mandibles blunt-tipped; wings with narrow costal area in most species (Fig. 30B) *Chrysopodes* (*Neosuarius*)
- 4'. Mandibles with fanglike tip (Fig. 32E); wings with wide costal area in most species (Fig. 36B) *Chrysopodes* (*Chrysopodes*)

Genus *Ceraeochrysa* Adams, 1982a

Adults of *Ceraeochrysa* are among the most colorful of all New World Chrysopini and most easily characterized. Individuals often have lateral or dorsal stripes on the scape and the pronotum usually has stripes or dark spots. Dark marks can also occur on the meso- and metanota. Dark margining of veins can occur on the wing membrane and some species have swelling and darkening of veins at the base of the posterior margin of the forewing. Females have a simple U-shaped spermatheca. Males of all species have an elongate rod (gonapsis) above sternite 8 + 9. Adams and Penny (1987) recorded the occurrence of a triangular gonapsis in one species of *Chrysopodes*. However, Brooks and Barnard (1990) regarded a gonapsis as absent from *Chrysopodes* and we have never observed a gonapsis in other species of *Chrysopodes*. *Ceraeochrysa* is the most speciose genus of Chrysopini in the New World with more than 50 described species. We add an additional four species in the current treatment. The genus is distributed from southern Canada (Penny et al. 1997) to northern Argentina (Penny 1978), although it is most abundant and speciose in the tropics. *Ceraeochrysa cincta* has been collected on bananas and citrus in Honduras (Adams and Penny 1987) and must be considered a prime candidate for biological control programs. In fact, many species of this genus are found in association with orchards and probably contribute significantly to natural pest control. López-Arroyo et al. (1999) recommended three species of *Ceraeochrysa* as biological control agents showing great potential in tropical America. Considerable recent work has been done on larval taxonomy of this genus by C. A. Tauber et al. (2000) and Tauber and de León (2001). Fifteen species have been collected in Brazilian agro-ecosystems and adults can be distinguished using the following key.

KEY TO MALES OF THE SPECIES OF *CERAEOCHRYSA* FOUND IN BRAZILIAN AGRO-ECOSYSTEMS

1. Pronotum with dark lateral stripes (Fig. 10A)	2
1'. Pronotum with two pair of dark circular marks (Fig. 15A); apex of sternite 8 + 9 with a pair of forcipate projections (Fig. 15C)	<i>C. paraguaria</i>
2. Antennal scape without dark markings (Fig. 21A); spermatheca long (Fig. 21C)	<i>C. dolichosvela</i>
2'. Antennal scape with stripes or spots (Fig. 11A)	3
3. Antennal scape with lateral spots (Fig. 13A)	4
3'. Antennal scape with dark stripes (Fig. 11A)	5
4. Dorsal apodeme of ectoproct extended ventrally as apically-expanded projection (Fig. 8C).	<i>C. acmon</i>
4'. Dorsal apodeme of ectoproct not extended ventrally as projection (Fig. 12C); gonarcus with dorso-medial, platelike projection (Fig. 13D)	<i>C. everes</i>
5. Scape with dorso-medial dark stripe (Fig. 11A)	6
5'. Scape with dorso-lateral dark stripe (Fig. 16A)	9
6. Scape stripe not extended basally onto antennal fossa (Fig. 10A)	<i>C. cincta</i>
6'. Scape stripe extended basally onto antennal fossa (Fig. 11A)	7
7. Antennal flagellum pale (Fig. 10A)	<i>C. caligata</i>
7'. Antennal flagellum dark (Fig. 11A)	8
8. Scape with two dark stripes (Fig. 14A); spermatheca U-shaped (Fig. 14C); dorsal apodeme of ectoproct not prolonged ventrally beyond ectoproct (Fig. 12C); gonapsis unforked (10F).	<i>C. montoyana</i>
8'. Scape with single dark stripe (Fig. 12A); spermatheca not U-shaped (Fig. 10E); dorsal apodeme of ectoproct extended ventrally beyond ectoproct (Fig. 11C); gonapsis forked caudally (Fig. 11F).	<i>C. claveri</i>
9. Antennal flagellum pale (Fig. 12A)	10
9'. Antennal flagellum dark (Fig. 20A)	12
10. Gonarcus with dorso-medial projection (Fig. 12G); gonosaccus with several large gonocristae (Fig. 12C) . .	<i>C. cubana</i>
10'. Gonarcus without dorso-medial projections (Fig. 19I); gonosaccus without gonocristae (Fig. 19J)	11

11. Apical hook of arcessus twice as long as wide (Fig. 19I); apex of sternite 8 + 9 with scattered setae not in well-defined field (Fig. 19D); forewing gradates not heavily shaded (Fig. 19B) *C. tucumana*
- 11'. Apical hook of arcess five times as long as wide (Fig. 18D); apex of sternite 8 + 9 with two lateral fields of long setae (Fig. 18C); forewing gradates heavily shaded (Fig. 18B) *C. tenuicornis*
12. Gonarcus with dorsal plate-like projection (Fig. 20C); mesonotum pale, without spots (Fig. 18A) 13
- 12'. Gonarcus without dorsal projection (Fig. 16I); paired dark spots on mesonotum (Fig. 17A) 14
13. Dorsal apodeme of ectoproct prolonged ventrally as projection; a group of scales on lateral membrane of gonosaccus adjacent to ventral projection of ectoproct (Fig. 22E); posterior apex of gonapsis smooth (Fig. 22G) *C. squama*
- 13'. Dorsal apodeme of ectoproct not prolonged ventrally as projection; no scales on lateral aspect of gonosaccus (Fig. 20F); gonapsis with teeth at posterior apex (Fig. 20E) *C. dislepis*
14. Dorsal apodeme of ectoproct prolonged ventrally as projection (Fig. 16C); gonosaccus with gonosetae on enormous basal tubercles (Fig. 16I) *C. sanchezi*
- 14'. Dorsal apodeme of ectoproct not forming ventral projection (Fig. 17C); gonosaccus with long setae on small basal tubercles (Fig. 17H). *C. scapularis*

Ceraeochrysa acmon Penny, 1998

DIAGNOSIS. — Males of this species are distinctive because of the expanded ventral tip of the ventral fork of the dorsal apodeme of the ectoproct. The often anvil-shaped form of this expansion gives this species a characteristic appearance and makes males of this species immediately recognizable.

HEAD. — Vertex greenish yellow, unmarked. Frons and gena yellow, unmarked. Scape straw yellow, darkened dorso-laterally (Fig. 8A); pedicel with dark band laterally; flagellum black. Maxillary and labial palpi pale, unmarked.

THORAX. — Green. Pronotum green with dark red stripe laterally (Fig. 8A). Meso- and metathorax unmarked. **Wings:** Forewing venation mostly green, except costal crossveins 1–11, origin of Rs, R-Rs crossveins, inner and outer gradates and endings of anal veins dark. Length (1.4–1.5 cm); width (0.45–0.48 cm). Hindwing venation green, except costal crossveins and gradates dark (Fig. 8B). Hindwing length (3.25 cm); width (1.03 cm) = ratio (3.16).

ABDOMEN. — Greenish yellow with small red spots on each side of tergites. **Male:** Dorsal apodeme of ectoproct with both dorsal and ventral branches widening apically (Fig. 8C). Membranous wall of genital atria juxtaposed against apex of ventral branch of dorsal apodeme bearing sclerotized plate with scales in several lines. Lateral arms of gonarcus long and triangular; medial arch bearing medial semicircular projection with two apical horns. Arcessus elongate, thin, ending in tripartite apex. Gonosaccus broad, with dense field of gonocristae and long setae (Fig. 8E, F). Gonapsis narrow and long, curved; subapically swollen; apex tapering to fine point (Fig. 8D). Apex of sternite 8 + 9 bearing lateral projections with setae having large, tubercle-like bases. **Female:** Subgenitale long, with lateral lobes and median projection (cremena) (Fig. 8H). Bursa copulatrix wrinkled with pair of large accessory glands. Spermatheca short, J-shaped (Fig. 8G).

MATERIAL EXAMINED. — **Costa Rica:** Limón, Amubri, A.C. Amistad, 4–21 December 1993, G. Gallardo, holotype male (deposited in INBIO). **Brazil:** São Paulo: Jaboticabal, 20 January 1998, Freitas, S. (2♀14♂); 10 September 1997, Freitas, S. (1♀); 9 December 1995, Freitas, S. (2♂); 23 March 1995, Freitas, S. (1♀); 22 February 1995, Freitas, S. (1♀); 12 October 1994, Gravena, R. (1♀); 13 November 1993, Jeronimo, E. (1♂); March 1999, Freitas, S. (1♀); São Simão, 2 January 1993, Freitas, S. (1♂)(eucalyptus); Birigui, 11 June 1994, Scomparin, C. H. J. (1♂); Balsamo, 20 December 1997, Freitas, S. (1♀); **Mato Grosso:** Corumba, 26 July 1995, Freitas, S. (1♀); Pontes e Lacerda, 14 July 1997, Freitas, S. (1♂)(rubber); Itiquira, 20 January 1994, Freitas, S. (1♀)(rubber).

Ceraeochrysa caligata (Banks, 1945)

DIAGNOSIS. — This species is a member of the group of species with a recurved ventral projection of the male dorsal apodeme of the ectoproct. The pale antennae separate *C. caligata* from *C. claveri* and *C. scapularis*. *Ceraeochrysa caligata* is probably most similar to *C. cincta*, but males can be separated by the longer, more slender ventral projection of the dorsal apodeme (Figs. 9C, 10C) and longer gonocornua (Figs. 9E, F; 10H, I) of *C. caligata*.

HEAD. — Green; frons and gena pale without marks. Scape and pedicel with thin dark red stripe continued onto membranous base (Fig. 9A); flagellum pale.

THORAX. — Green; pronotum with dark red stripe laterally (Fig. 9C), mesoscutum with dark marks (Fig. 9A); metanotum unmarked. **Wing:** Venation green with some transverse veins black or darkened. Forewing: costal crossveins 4 to 10, origin of Rs, R-Rs crossveins 1 to 2, 4 to 8, inner and outer gradates, Psm-Psc crossveins 3 to 5 black. Length (1.5 cm): width (0.6 cm) = ratio (2.5). Hindwing venation green (Fig. 9B). Hindwing length (1.42 cm): width (0.45 cm) = ratio (3.16).

ABDOMEN. — Green, unmarked. **Male:** Ventral arm of dorsal apodeme of tergite 9 + ectoproct apically blunt and upturned (Fig. 9C). Gonarcus narrow, curved. Gonocornua long and decurved. Arcessus broad, with a pair of lateral and subapical horns, apically decurved. Gonosaccus with sparse elongate setae (Fig. 9E, F). Gonapsis thick and short (Fig. 9G). **Female:** Subgenitale short and thick, forming part of a heavily sclerotized plate (Fig. 9H); bursa large sac-like; spermatheca with short ventral impression (Fig. 9D).

MATERIAL EXAMINED. — **Panama:** Puerto Cabello, 11 June 1908, holotype male (deposited in Museum of Comparative Zoology, Harvard University). **Brazil: São Paulo:** Jaboticabal, 24 October 1990, Silva, A. D. (1♂)(orange); 2 September 1993, Narciso, R. (2♀)(orange); January 1995, Scomparin, C. H. J. (1♂)(orange); Taquaritinga 16 October 1993, Xavier, A. L. Q. (1♀)(CAS); 5 March 1994, Xavier, A. L. Q. (1♂)(orange), 4 October 1993, Xavier, A. L. Q. (2♀)(orange); Jaboticabal 7 April 1999, Freitas, S. (3♂); **Mato Grosso:** Itiquira, 13 January 1997, Freitas, S. (1♂1♀)(rubber).

Ceraeochrysa cincta (Schneider, 1851)

DIAGNOSIS. — This species is a member of the group of species with a recurved ventral projection of the dorsal apodeme of the ectoproct. In Brazil, this species can be separated from *C. montoyana*, *C. scapularis* and *C. claveri* by their having dark antennae. Additionally, *C. scapularis* has dark spots on the mesonotum, *C. montoyana* has a double scape stripe and *C. claveri* has an apically bifurcate gonapsis. Though closely related, *C. caligata* males have a longer, thinner ventral projection of the dorsal apodeme of the ectoproct and longer gonocornua.

HEAD. — Vertex green; gena and frons pale yellow, unmarked; maxillary and labial palpi pale; antenna pale, apex fuscous; scape and pedicel with dorsal dark red stripe (Fig. 10A).

THORAX. — Green; pronotum with dark red stripe laterally (Fig. 10A); meso- and metanota unmarked. **Wings:** Forewing venation mostly yellowish green, except costal crossveins 5–11, origin of Rs, R-Rs crossveins 1–4, inner and outer gradates, Psm-Psc crossveins 1–4, and endings of anal veins dark. Length (1.4 cm): width (0.5 cm) = ratio (2.96). Hindwing costal crossveins, R-Rs crossveins, and middle part of Rs black (Fig. 10B). Length (1.11 cm): width (0.36 cm) = ratio (3.08).

ABDOMEN. — Green, unmarked. **Male:** Dorsal apodeme of tergite 9 + ectoproct heavily sclerotized bearing a posteriorly-directed ventral branch (Fig. 10C). Gonarcus with vertically flattened lateral arms and two caudally-directed, medial horns (gonocornua). Entoprocessus elongate, extending well below arcessus. Arcessus with a transverse basal sclerite with two latero-apical horns, apical sclerite with a decurved apical point. A field of tiny gonocristae arranged in rows above tergite 8 + 9 (Fig. 10H, I). Gonapsis long, slender, apically upturned (Fig. 10F). **Female:** Area between

subgenitale and 9th sternite heavily sclerotized (Fig. 10D). Subgenitale with ventral invagination without central projection (Fig. 10G). Spermatheca U-shaped, short, linked to bursa by short duct; bursa wrinkled, sac-like (Fig. 10E).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Taquaritinga, 5 March 1994, Xavier, A. L. Q. (3♂)(orange); 12 September 1992, Freitas, S. (1♀)(cotton); 20 September 1993, Xavier, A. L. Q. (2♀); 12 September 1992, Freitas, S. (5♂); Jaboticabal, 9 December 1995, Freitas, S. (1♂2♀); 30 September 1997, Freitas, S. (1♀)(CAS); 2 October 1997, S. Freitas (1♂)(CAS); **Mato Grosso:** Itiquira, 20 January 1997, Freitas, S. (1♂); 14 June 1997, Freitas, S. (1♀)(rubber).

Ceraeochrysa claveri (Navás, 1911)

DIAGNOSIS. — This species is often more yellow in coloration than others of the genus. It is a member of the group of species with males having a recurved ventral projection of the dorsal apodeme of the ectoproct. This is one of three Brazilian species with dark antennae. However, *C. montoyana* has a double dorsal scape stripe, and *C. scapularis* has dark spots on the mesonotum. Males of *C. claveri* also have a distinctive thick apical fork of the gonapsis.

HEAD. — Vertex golden yellow; frons and gena pale, unmarked; pedicel and scape with a dorsal mid-line red stripe continued onto the antennal basal membrane as a triangular spot; flagellum black (Fig. 11A); maxillary and labial palpi pale.

THORAX. — Green; pronotum yellow with dark red stripe laterally (Fig. 11A); meso- and metanota unmarked. **Wings:** Venation mostly green with some crossveins black: forewing costal crossveins 4–12, origin of Rs base, R-Rs crossveins, Rs-Psm crossveins 1–4, gradates, Psm-Psc crossveins 6–8, unforked marginal veins, and cubital and anal vein endings dark. Length (1.4 cm): width (0.5 cm) = ratio (3.08). Hindwing costal crossveins 5–13, R-Rs crossveins, and gradates dark (Fig. 11B). Length (1.37 cm): width (0.42 cm) = ratio (3.26).

ABDOMEN. — Green, unmarked. **Male:** Dorsal apodeme of tergite 9 + ectoproct bearing ventral fork which is apically acute (Fig. 11C). Gonapsis long, slender, posteriorly forked (Fig. 11F). Gonarcus not arched. Entoprocessus long, caudally pointed. Arcessus short, membranous, triangular in dorsal view, without dorsal horns. Gonosaccus with sparse gonosetae (Fig. 11H, I); above apex of 9th sternite a field of gonocristae (Fig. 11E). **Female:** Area between subgenitale and 7th sternite heavily sclerotized (Fig. 11D). Bursa copulatrix with a pair of large glands (Fig. 11G). Spermatheca elongate, U-shaped, ventral impression elongate.

MATERIAL EXAMINED. — **Brazil: São Paulo:** Taquaritinga, 16 October 1993, (3♀2♂); 5 March 1994, Xavier, A. L. Q. (2♂2♀)(orange); 7 January 1993, Freitas, S. (2♂)(corn); 30 March 1993, Freitas, S. (2♂1♀)(guava); **Mato Grosso:** Itiquira, 7 September 1999, Freitas, S. (3♂4♀)(rubber)(SDF/CAS).

Ceraeochrysa cubana (Hagen, 1861)

DIAGNOSIS. — This is a rather small species with pale antennae and considerable dark markings on the forewings. Females are indistinguishable from the more northern *C. valida*. Males have a number of autapomorphies: abdominal spiracles are unusually enlarged; the apex of sternite 8 + 9 is bifurcate and spiny; there are several large gonocristae on the gonosaccus; and the gonarcus has a vertical dorso-medial plate. Males also have a rugose vertex which is otherwise only found in *C. paraguaria* and *C. scapularis*.

HEAD. — Green; vertex glossy on female and rugose on male, unmarked; scape with a dark red, thin stripe dorso-laterally (Fig. 12A); flagellum pale; frons and gena unmarked.

THORAX. — Green. Pronotum with light red stripes laterally (Fig. 12A). Meso- and metanota unmarked. **Wings:** Venation green with black crossveins. Forewing costal crossveins 2–15, origin of Rs,

R-Rs crossveins 1–8, inner and outer gradates, Psm-Psc crossveins 3–8, and cubital and anal veins apical endings dark. Length (1.15 cm): width (0.37 cm) = ratio (2.97). Hindwing costal crossveins 4–12, R-Rs veins 1–4, and inner and outer gradates dark (Fig. 12). Length (1.06 cm): width (0.32 cm) = ratio (3.31).

ABDOMEN. — Green, unmarked. **Male:** Dorsal surface of 9th tergite + ectoproct deeply grooved; apex of 9th sternite with pair of lateral projecting forcipate lobes (Fig. 12D); dorso-laterally to ninth sternites two lobes bearing teeth and setae (Fig. 12C). Gonarcus broad with a dorso-medial, plate-like projection. Entoprocessus short. Arcessus large, apico-medially, decurved and acute. Gonosaccus with long setae (Fig. 12F, G). Gonapsis long and wide. **Female:** Spermatheca short. Bursa sac-like, wrinkled (Fig. 12E).

MATERIAL EXAMINED. — **Cuba:** Soledad, near Cienfuegos, 6–20 August, Banks, N., neotype male (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: São Paulo:** Taiuva, 23 July 1990, Scatolin, M. (2♀)(orange); 23 October 1990, Scatolin, M. (3♂)(orange); Taquaritinga, 8 January 1993, Xavier, A. L. Q. (3♂)(orange); 25 March 1993, Xavier, A. L. Q. (5♀); Jaboticabal, 22 February 1995, Freitas, S. (40♂35♀)(corn, guava, cotton, eucalyptus)(SDF/CAS); **Mato Grosso:** Itiquira, 20 January 1997, Freitas, S. (3♂)(rubber).

Ceraeochrysa everes (Banks, 1920)

DIAGNOSIS. — This species is a member of the *everes* species group with males having thick-based spines at the apex of sternite 8 + 9, a broad dorsal plate medially on the gonarcus; broad, vertically oriented entoprocesses; vertically elongate lateral arms of the gonarcus, and a field of gonocristae laterally below the apex of the ectoproct. Of these species, the more northern *C. costaricensis* has two dark spots on the pronotum rather than longitudinal stripes. *Ceraeochrysa everes* has a field of gonosetae which line up in rows and evenly curved ventral margin of the ectoproct, while *C. squama* has a randomly arranged field of gonosetae and a sclerotized ventrally projecting arm of the ectoproct at the apex of the dorsal apodeme.

HEAD. — Greenish yellow; frons and gena unmarked; maxillary and labial palpi pale; scape and pedicel green with middle of lateral surface bearing reddish brown diffuse spot, sometimes poorly defined; flagellum black (Fig. 13A).

THORAX. — Green. Pronotum somewhat yellowish with lateral reddish to chocolate brown stripe (Fig. 13A). Meso- and metanota unmarked. **Wings:** Venation mostly green, except for some crossveins dark (Fig 13B): Forewing costal crossveins in middle part, R-Rs crossveins at apical ends, and inner and outer gradates dark. Length (1.52 cm): width (0.46 cm) = ratio (3.0) Hindwing inner gradates dark. Length (1.35 cm): width (0.43 cm) = ratio (3.14).

ABDOMEN. — Green, unmarked; **Male:** Tergite 9 + ectoproct without visible ventral projection of apodeme (Fig. 13I). Gonapsis flattened, apex plate-like and upturned with row of small apical teeth and one larger dorso-apical tooth (Fig. 13H). Gonarcus strongly arched horizontally with a vertically oriented, medio-dorsal plate; lateral arms crescent-shaped. Arcessus membranous basally with a pair of hooks and two inflated lobes; apex bearing a medial hook and pair of lateral, decurved and medially-curved sclerotized lobes. Gonosaccus large with dense medial field of stout setae; two lateral lobes of gonosaccus with long setae, and between medial field of short gonosetae and lateral field of long gonosetae a field of tiny gonocristae. Lateral to the genital atria a field of tiny scales arranged in several lines. Apex of sternite 8 + 9 with large basal tubercles bearing setae arranged on two lateral lobes (Fig. 13C, D, E). **Female:** Spermatheca elongate, twisted, opening into a transversally wrinkled bursa (Fig. 13G). Subgenitale heavily sclerotized with a median projection (cremena), attached to bursa by a sclerotized plate.

MATERIAL EXAMINED. — **French Guiana:** Roches de Kourou, July, Le Moul, lectotype female (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: São Paulo:**

Jaboticabal, 20 January 1998, Freitas, S. (4♂)(corn)(SDF/CAS); 12 February 1995, (1♂)(guava); Luiz Antonio, 8 December 1993, Freitas, S. (1♂)(eucalyptus); Taquaritinga, 20 November 1992, Freitas, S. (1♂)(orange); 8 January 1993, Xavier, A. L. Q. (1♀)(orange); 5 March 1994, Xavier, A. L. Q. (1♂)(orange); Balsamo, 20 December 1997, Freitas, S. (1♂)(rubber); **Mato Grosso:** Itiquira, 10 September 1996, Scomparin, C. H. J. (2♀)(rubber); 23 September 1996, Scomparin, C. H. J. (1♀)(CAS).

***Ceraeochrysa montoyana* (Navás, 1913a)**

DIAGNOSIS. — This species is closely related to other *cincta* group species that have dark antennae, such as *C. claveri*. However, in *C. claveri* the scape has a single stripe that continues onto the antennal basal membrane, and the spermatheca of *C. claveri* is not U-shaped. In addition, the two-stripped scape of *C. montoyana* is a distinctive characteristic.

HEAD. — Vertex golden yellow; gena and frons pale yellow; scape yellow, with two red stripes, one dorso-laterally and the other dorso-centrally, the central one continuing onto antennal basal membrane (Fig. 14A); pedicel with red markings; flagellum black.

THORAX. — Green. Pronotum green with lateral dark red stripes (Fig. 14A). Meso- and metanota green, unmarked. **Wings:** Forewing venation mostly green, except costal crossveins, R-Rs crossveins, first Rs-Psm crossveins, Psm-Psc, apical and anal endings dark. Length (1.5 cm): width (0.54 cm) = ratio (2.78). Hindwing venation mostly green, except R-Rs crossveins dark (Fig. 14B). Length (1.38 cm): width (0.45 cm) = ratio (3.07).

ABDOMEN. — Green, without marks. **Female:** Spermatheca V-shaped, short, with long spermathecal gland (Fig. 14C). Subgenitale with two anterior lobes (Fig. 14D).

MATERIAL EXAMINED. — **Brazil:** **São Paulo:** Jaboticabal, 25 March 1999, Freitas, S. (1♀)(guava).

***Ceraeochrysa paraguaria* (Navás, 1920) new combination**

DIAGNOSIS. — This species is easily recognized by the four round small spots on the pronotum. Sometimes *C. paraguaria* is confused with *Plesiochrysa brasiliensis* when only external morphological characteristics are considered. However, *P. brasiliensis* is a larger, more robust species, with pronotum that is longer than wide. The pronotal spots of *C. paraguaria* are much darker and well-delimited, not diffuse. Finally, the bifurcate apex of sternite 8 + 9 in males is found only in *C. cubana* and *C. scapularis*.

HEAD. — Green; frons and gena unmarked; scape, pedicel and flagellum pale, unmarked.

THORAX. — Green. Pronotum with pair of dark red small spots laterally on either side (Fig. 15A). Meso- and metanota unmarked. **Wings:** Venation green, except for certain crossveins: forewing costal crossveins 4–10, origin of Rs, R-Rs crossveins, Psm-Psc crossveins 1–3, cubital and anal veins, imc lateral veins, and inner and outer gradates dark. Length (1.25 cm): width (0.41 cm) = ratio (3.04). Hindwing costal crossveins dark (Fig. 15B). Length (1.08 cm): width (0.33 cm) = ratio (3.27).

ABDOMEN. — Green, unmarked. **Male:** Tergite 9 + ectoproct deeply grooved dorsally forming two separate lobes. Sternite 8 + 9 apically bifurcate. Gonarcus narrow, lateral arms projecting vertically. Entoprocessus short and wide. Gonocornua long, tapered, reaching apex of arcessus. Arcessus triangular; apically acutely decurved. Gonosaccus with many long setae (Fig. 15H, I). Gonapsis slender with multi-pronged apical appendage (Fig. 15E). **Female:** Subgenitale short and wide (Fig. 15F). Spermatheca short, with thick, twice-coiled spermathecal gland.

MATERIAL EXAMINED. — **Brazil:** **São Paulo:** Taquaritinga, 7 January 1993, Freitas, S. (9♂12♀)(orange); Jaboticabal, 17 February 1995, Freitas, S. (12♂)(orange); 20 October 1994, Cha-

gas, A. (2♀)(orange); 7 August 1996 Freitas, S. (4♂4♀) (guava); 20 October 1996, Freitas, S. (1♂1♀)(CAS).

REMARKS. — Navás described *Chrysopa paraguaria* in 1920. Later, Navás (1924) modified the name to *C. paraguaria*. However, Article 32.5.1 of the International Code of Zoological Nomenclature (ICZN 1999) states that "If there is in the original publication itself, without recourse to any external source of information, clear evidence of an inadvertent error, such as a lapsus calami or a copyist's or printer's error, it must be corrected. Incorrect transliteration or latinization, or use of an inappropriate connecting vowel, are not to be considered inadvertent errors." Thus, without any indication in the original publication that this name was incorrectly spelled we have maintained the original spelling. Brooks and Barnard (1990) listed this species in *Plesiochrysa*, but the male genitalia, including elongate gonapsis, clearly indicate placement of this species in *Ceraeochrysa*.

Ceraeochrysa sanchezi (Navás, 1924b)

DIAGNOSIS. — This is one of the species with dark antennae which can be separated most easily by characteristics of the male genitalia. The elongate ventral projection of the ectoproct and subapical dorsal projection of the ninth sternite are characteristic of this species, as is the pair of triangular fields of gonocristae projecting above and medial to the apex of the ninth sternite.

HEAD. — Yellow; frons and gena unmarked; maxillary and labial palpi pale; scape and pedicel yellow with lateral stripe brown, continued onto antennal basal membrane (Fig. 16A). Flagellum black. Maxillary and labial palpi pale.

THORAX. — Yellow. Pronotum with lateral stripe thick, red. Mesopraescutum and mesoscutum with lateral red spots (Fig. 16A). **Wings:** Venation mostly green with the following transverse veins black: forewing costal crossveins, origin of Rs, R-Rs crossveins; inner and outer gradates, Psm-Psc crossveins, anal and cubital vein apices, marginal forks and unforked apices. Length (1.35 cm): width (0.45 cm) = ratio (2.96). Hindwing veins: costal crossveins 4–10; R-Rs crossveins 5–8; inner and outer gradates dark (Fig. 16B). Length (1.14 cm): width (0.35 cm) = ratio (3.26).

ABDOMEN. — Yellow, without dark marks. **Male:** Tergite 9 + ectoproct with finger-like dorsal projection of dorsal apodeme above callus cerci and elongate ventral lobe of dorsal apodeme projecting ventrally from ectoproct (Fig. 16C). Sternite 8 + 9 with lateral concavities, which receive ventral ectoproct projection and subapical dorsally-projecting lobes (Fig. 16D). Gonapsis slender, apex with multi-lobed, spiny appendages (Fig. 16G). Gonarcus thick, lateral arms triangular in shape. Entoprocessus quite broad, apically obtusely pointed. Arcessus triangular, apex forming medial decurved point. Gonosaccus with three pair of long setae originating from stout bases. Posterior to gonosaccus a pair of triangular lobes with fields of gonocristae (Fig. 16I, J). **Female:** Bursa wrinkled, with a pair of large accessory glands (Fig. 16H). Spermatheca U-shaped with distal portion dilated (Fig. 16F). Subgenitale with median projection (cremena) and basal sclerotized plate (Fig. 16E).

MATERIAL EXAMINED. — **Cuba:** Havana, Playa Chivo, 18 December 1923, Cervera, holotype male (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: Rio Grande do Norte:** Assu, 6 June 1991, Freitas, S. (2♂2♀)(cantaloupe); **São Paulo:** Jaboticabal, 5 March 1992, Freitas, S. (1♀)(orange); 26 January 1995, Freitas, S. (1♀1♂)(guava); 2 May 1995, Seguin, L. D. (1♂); 4 December 1996, Freitas, S. (1♀)(CAS); 10 February 1998, Freitas, S. (1♂)(CAS); Taquaritinga, 7 January 1993, Freitas, S. (2♂)(orange); **Mato Grosso,** Itiquira, 7 September 1999, Freitas, S. (2♂1♀).

Ceraeochrysa scapularis (Navás, 1914)

DIAGNOSIS. — This is a small species most closely related to *C. cubana* and *C. paraguaria*. All three species have a bifurcate apex of sternite 8 + 9 and gonosetae with large bases. Of the three, *C. scapularis* is the only one with dark antennae and two dark spots on the mesonotum.

HEAD. — Yellowish green. Gena and frons unmarked. Scape with lateral dark red stripe, pedicel dark-ringed; flagellum black (Fig. 17A). Maxillary and labial palpi pale.

THORAX. — Greenish yellow. Pronotum as long as wide with lateral red stripe (Fig. 17A). Mesonotum with pair of small dark red spots (Fig. 17A). **Wings:** Green longitudinal veins and black crossveins. Forewing crossveins darker than hindwing veins: costal crossveins 1–15, origin of Rs; R-Rs crossveins 1–9; inner and outer gradates; Psm-Psc crossveins 1–7; anals, cubitals and unforked marginal endings black (Fig. 17B). Length (1.1 cm): (0.35 cm) = ratio (3.03). Hindwing costal crossveins; R-RS crossveins, Rs-Psm crossveins, inner and outer gradates, and bases of Psm-Psc crossveins black. Length (0.99 cm): width (0.29 cm) = ratio (3.41).

ABDOMEN. — Greenish yellow. **Male:** Tergite 9 + ectoproct deeply grooved dorsally. Apex of sternite 8 + 9 with two forcipate lobes (Fig. 17D). Gonarcus thick. Gonocornua slender and upturned. Arcessus triangle-shaped, apex tapered into a medial point. Gonosaccus with apical field of long setae (Fig. 17H, I). Posterior to gonosaccus two large lateral lobes with strong gonocristae and medial field of small gonocristae (Fig. 17C). Gonapsis elongate, narrow, widening subapically (Fig. 17E). **Female:** Subgenitale without median projection (Fig. 17G). Bursa with two large accessory glands (Fig. 17F). Spermatheca U-shaped with broad spermathecal duct.

MATERIAL EXAMINED. — **Brazil: São Paulo:** Catanduva, January 1995, Silva, J. L. (1♂)(orange); Luiz Antonio, 9 December 1991, Freitas, S. (1♂)(eucalyptus); 5 October 1993, Crispolin, F. (3♀)(eucalyptus); Jaboticabal, 17 February 1995, Freitas, S. (10♂)(orange); 23 March 1995, Freitas, S. (1♂)(orange); 14 July 1995, Freitas, S. (1♂)(orange); 17 February 1995, Freitas, S. (4♀)(orange); 7 August 1996, Freitas, S. (2♂)(CAS).

Ceraeochrysa tenuicornis Adams and Penny, 1987

DIAGNOSIS. — This species cannot be separated with certainty from other species of *Ceraeochrysa* without study of the male genitalia. Of the male genital elements, the elongate gonocornua and ventral field of small gonosetae on the gonosaccus are most characteristic.

HEAD. — Yellowish green. Frons, gena and vertex unmarked. Scape, pedicel and flagellum pale; scape with a tiny dark spot on apico-lateral margin (Fig. 18A).

THORAX. — Pale green. Pronotum yellow with pale red stripe laterally (Fig. 18A). Meso- and metanota green, unmarked. **Wings:** Venation green, except some costal crossveins, R-Rs crossveins, gradates darkened; gradates darkly bordered. Forewing stigma unmarked. Length (0.96 cm): width (0.33 cm) = ratio (2.91). Hindwing venation green (Fig. 18B). Length (0.83 cm): width (0.25 cm) = ratio (3.32).

ABDOMEN. — Green. Tergites large, unmarked. **Male:** Dorsal apodeme of tergite 9 + ectoproct dark, forked at callus cerci, which has a few trichobothria (Fig. 18C). Sternite 8 + 9 densely covered by setae on conspicuous tubercles. Gonarcus thick, hardly arched, with fan-like lateral arms. Entoprocessus short and sharply decurved. Gonocornua straight, angled upward, reaching almost 2/3 length of arcessus. Arcessus divided: basal sclerite bearing two small horns and apical narrow, slender sclerite terminally decurved. Gonosaccus bearing laterally two pockets of long setae and ventrally a lobe with large field of tiny gonosetae, between them some small points in a vertical line (Fig. 18D, E). Gonapsis straight, unforked (Fig. 18F).

MATERIAL EXAMINED. — **Brazil: Amazonas,** Manaus, INPA campus, 23 April 1976, I. S. Goreyeb, holotype male (deposited at INPA), **Mato Grosso:** Itiquira, 20 January 1997, Freitas, S. (1♂)(rubber).

REMARKS. — This is a species not known from south of the Amazon Basin and no females were collected during this project. For a description of the female, see Adams and Penny (1987).

Ceraeochrysa tucumana (Navás, 1919), new status

DIAGNOSIS. — *Ceraeochrysa tucumana* is a small species that resembles *Chrysoperla externa* in wing venation, but has stripes on the antennal scape and pronotum. The male genitalia and sternite 8 + 9 resemble *C. lineaticornis* (C. A. Tauber et al. 2000) and *C. berlandi* (Museum of Comparative Zoology material), but they have dark antennae and do not have the field of gonocristae below the gonosaccus.

HEAD. — Greenish yellow. Frons and gena without marks. Maxillary and labial palpi pale. Scape with lateral brown stripe, pedicel dark-ringed; flagellum pale (Fig. 19A).

THORAX. — Pale green. Pronotum with lateral stripe reddish brown (Fig. 19A). Meso- and metanota unmarked. **Wings:** Venation mostly green with some transverse veins black: forewing costal crossveins 1–13, origin of Rs, Rs-Psm crossveins 1–3, inner and outer gradates, and Psm-Psc crossveins. Length (1.09 cm): width (0.37 cm) = ratio (2.96). Hindwing costal crossveins 1–13, R-Rs crossveins; and inner and outer gradates dark (Fig. 19B). Length (0.92 cm): width (0.30 cm) = ratio (3.07).

ABDOMEN. — Greenish yellow with pale red spots on the tergites 2 and 3. **Male:** tergite 9 + ectoprocts deeply divided dorsally making two lateral lobes (Fig. 19E); apex of sternite 8 + 9 with pointed projection and thick-based setae (Fig. 19D). Gonarcus thick. Entoprocessus elongate, thin, decurved. Gonocornua vertically curved. Arcessus large, with medio-dorsal forked horn; apex upturned as sclerotized lobe with apical hook (Fig. 19I, J). Gonapsis slender (Fig. 19H). Gonosaccus with two lateral, protruding fields of long setae. Between gonosaccus and sternite 8 + 9 a membranous area with gonocristae. **Female:** Spermatheca short with thick spermathecal gland (Fig. 19F). Subgenital with short median projection (Fig. 19G).

MATERIAL EXAMINED. — **Brazil:** São Paulo: Taquaritinga, 8 January 1993, Xavier, A. L. (1♂)(orange); 1 June 1994, Narciso, R. (1♀)(orange); Luiz Antonio, 8 September 1993, Freitas, S. (1♂)(eucalyptus); 21 September 1993, Freitas, S. (3♂)(eucalyptus); 8 November 1993, Freitas, S. (2♂1♀)(eucalyptus); 21 December 1993, Freitas, S. (5♂3♀)(eucalyptus); 5 October 1993, Crispolin, F. (3♀)(eucalyptus); 13 July 1992, Freitas, S. (1♀)(eucalyptus); 29 April 1994, Freitas, S. (1♀)(CAS); 8 December 1998, Freitas, S. (1♀)(CAS).

REMARKS. — In his original description, Navás indicated that the type (sex not specified) was deposited in the museum at La Plata, Argentina. In their world list of chrysopid species, Brooks and Barnard (1990) placed this species as an “incertae sedis” at the end of the list. Phillip Adams found the type male at the Buenos Aires Museum, cleared and stained the genitalia, and made detailed sketches. These sketches were used to identify the above material. The genital elements include an elongate gonapsis, clearly placing this species in *Ceraeochrysa*.

Ceraeochrysa displepis de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Bra-MT-Itiquira, P. E. Michelin 20/1/97, Freitas, S. Leg. 14♂.”

DIAGNOSIS. — This species is a member of the *everes* species group with males having thick-based setae at the apex of sternite 8 + 9; a thick medial field of small gonosetae on the gonosaccus; a broad dorsal plate on the gonarcus; elongate, vertically-tapering, lateral arms to the gonarcus; and a pair of distinctive dorsal projections just posterior to the gonarcus. Of the four known species in the group, two [*C. costaricensis* (Penny 1997) and *C. squama*] have ventral projections from the ectoproct and gonapsis with lateral wings, while the other two species (*C. everes* and *C. displepis*) have no ventral projection from the ectoproct and a gonapsis terminating in a vertical plate with teeth. Although similar, *C. displepis* can be separated from *C. everes* by the central indentation of

the medial plate of the gonarcus and the lack of a field of tiny gonocristae laterally on the membrane below the ectoproct.

The name comes from “dis” meaning separated and “lepis” scales, describing the two lateral fields of small, scaly gonocristae on the gonosaccus.

HEAD. — Yellowish green. Vertex, frons and gena unmarked. Maxillary and labial palpi pale yellow, unmarked. Scape yellow with lateral brown stripe widening apically; pedicel as scape; flagellum black (Fig. 20A).

THORAX. — Green. Pronotum green with a dark red lateral stripe (Fig. 20A). Meso- and metanota unmarked. **Wings:** Forewing longitudinal veins green; costal crossveins, R-Rs crossveins, inner and outer gradates, anterior intersection of Psm-Psc crossveins, forked and unforked marginal veins, and margins near forks darkened. Length (1.3 cm): width (0.4 cm) = ratio (3.25). Hindwing apically acutely pointed, green except costal crossveins; R-Rs crossveins, apex of Rs, and outer gradates dark (Fig. 20B). Length (1.14 cm): width (0.37 cm) = ratio (3.08).

ABDOMEN. — Green, unmarked. **Male:** Dorsal apodeme of tergite 9 + ectoproct without ventral projection. Gonapsis flattened, anterior apex a vertical plate bearing two rows of teeth (Fig. 20E). Gonarcus lightly curved with dorsal medially-indented plate (Fig. 20C). Arcessus with dorso-lateral inflated lobes, a pair of small dorsal acute lobes, and decurved apical median hook with lateral lobes (Fig. 20D). Gonosaccus with lateral field of long setae and ventral fields of tiny gonocristae below setal fields (Fig. 20D). Apex of sternite 8 + 9 bearing setae with thick bases arranged on small lateral lobes (Fig. 20F). **Female:** Spermatheca twisted, but not coiled, apex with lateral alate projection (Fig. 20G). Bursa a large, transversely wrinkled sac with pair of large accessory glands.

OTHER MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 11 January 1997, Freitas, S. (1 ♀ paratype)(rubber); 20 January 1997, Freitas, S. (1 ♂ paratype)(rubber); 14 September 1998, Freitas, S. (1 ♂ paratype)(rubber); 10 September 1996, Scomparin, C. H. J. (1 ♀ paratype)(rubber); 4 November 1996, Scomparin, C. H. J. (2 ♀ 1 ♂ paratypes)(rubber)(SDF/CAS); 30 December 1996, Scomparin, C. H. J. (1 ♂)(rubber); 18 July 1998, Freitas, S. (1 ♀ paratype)(rubber); 18 November 1996, Scomparin, C. H. J. (1 ♂ paratype)(rubber); **São Paulo:** Jaboticabal, 22 November 1995, Freitas, S. (1 ♀ paratype)(orange); 7 July 1996, Freitas, S. (1 ♂ paratype)(CAS); 30 September 1997, Freitas, S. (1 ♂ paratype)(orange); 7 July 1998, Freitas, S. (1 ♂ paratype)(orange); 17 November 1995, Freitas, S. (1 ♀ paratype)(orange); November 1995, Freitas, S. (1 ♂ paratype)(orange); Luiz Antonio, 8 December 1993, Freitas, S. (1 ♂ paratype)(eucalyptus); 21 December 1993, Freitas, S. (1 ♂ paratype)(eucalyptus); **Goiás:** Cachoeira Alta, 10 June 1997, Freitas, S. (1 ♀ paratype)(rubber).

Ceraeochrysa dolichosvela de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled, “Bra-SP-Jaboticabal, FCAV, 20/1/98, 69, Freitas, S. Leg.”

DIAGNOSIS. — The long, uncoiled shape of the spermatheca is not found in any other species.

The name “dolichovela” comes from the Greek *dolichos* meaning long, and refers to the long spermatheca and its vela in this species.

HEAD. — Vertex, gena and frons greenish yellow. Unmarked. Scape yellow-orange; pedicel black; flagellum black. Maxillary and labial palpi pale (Fig. 21A).

THORAX. — Green with a pale stripe on mid-line. Pronotum green with pale brown-red lateral stripe (diffuse in paratype) (Fig. 21A). Meso- and metanota unmarked. **Wings:** Venation mostly green, except costal crossveins, R-Rs transverse veins and gradates black. Length (1.49 cm): width (0.5 cm) = ratio (2.88). Hindwing venation mostly green, except R-Rs transverse veins and outer gradates black (Fig. 21B). Length (1.26 cm): width (0.41 cm) = ratio (3.07).

ABDOMEN. — Green with pale stripe along mid-line. **Female:** Spermatheca extremely long, slender, uncoiled; with long spermathecal duct (Fig. 21C). Posterior part of subgenitale bilobed, with large medial anterior projection.

OTHER MATERIAL EXAMINED. — **Brazil: Mato Grosso do Sul:** Corumba, 23 July 1995, Freitas, S. (1 ♀ paratype)(orange).

Ceraeochrysa squama de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Jaboticabal, SP, 20/01/95, SP14A, Freitas, S.” (guava).

DIAGNOSIS. — This species is a member of the *everes* species group with character states listed under *C. dislepis*. The lateral arms of the gonapsis relate it most closely with *C. costaricensis* Penny, 1997, but it differs in having dark antennae and red stripes rather than spots laterally on the pronotum.

The name “*squama*” comes from the Latin for scale, and refers to the two fields of tiny gonocristae laterally on gonosaccus.

HEAD. — Vertex, frons and gena golden yellow, unmarked. Maxillary and labial palpi pale. Scape golden yellow, with small brown spot at apical dorso-lateral corner; pedicel with lateral brown stripe; flagellum black (Fig. 22A).

THORAX. — Green. Pronotum green with lateral dark red stripe. Meso- and metanota unmarked (Fig. 22A). **Wings:** Forewing venation mostly green with some transverse veins darkened, such as costal crossveins and R-Rs crossveins. Length (1.3 cm): width (0.46 cm) = ratio (2.83). Hindwing venation mostly green, except inner and outer gradates dark (Fig. 22B). Length (1.17 cm): width (0.36 cm) = ratio (3.25).

ABDOMEN. — Yellowish green, unmarked. **Male:** Dorsal apodeme of tergite 9 + ectoproct strongly sclerotized and with ventral projection (Fig. 22E). Gonapsis flattened, apex turned up as vertical plate-like lobe, but without teeth; subapical part with lateral alate projection apically decurved (Fig. 22G). Gonarcus strongly arched, with median plate-like projection as long as wide; lateral arms broadly rounded ventrally. Two inflated dorsal projections posteriad of gonarcus. Arcessus membranous basally with pair of small diverging lobes; apex medially acute and lateral membranous lobes. Gonosaccus large, with dense central field of small, stout setae; two lateral lobes with long setae flanked by a field of tiny gonocristae. Plate of randomly organized, sclerotized, pointed scales laterally on membranous wall of genital atrium, probably juxtaposed with ventral projection of ectoproct when depressed (Fig. 22A, B, C).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 30 September 1997, Freitas, S. (1 ♂ paratype); 24 April 1999, Takahashi, K. (1 ♂ paratype)(guava).

Genus *Chrysoperla* Steinmann, 1964

This is probably the most studied genus in the family. Adults are abundant in north temperate fields and yards, and are attracted to lights. They feed on grass pollen and are the most frequently considered candidates for inundative releases in fields and orchards for biological control. They are being mass-reared commercially for biological control programs in the U.S.A. (Tauber et al. 2000).

In a recent revision of the genus, Brooks (1994) found 35 species distributed world-wide, but with a preponderance of species in the Holarctic Region. Adult males of this genus have one distinctive structural feature. Sternite 8 + 9 of males is subapically constricted, giving the apex the appearance of a small apical lobe (Figs. 23E, 24D, 25C). All New World species have red genae, and lateral setae on the pronotum have thickened bases. However, other chrysopids have red genae and females must be identified with great caution. In this study we have found three species; the adults can be distinguished using the following key.

KEY TO THE SPECIES OF *CHRYSOPERLA* IN BRAZILIAN AGRO-ECOSYSTEMS
(modified from Brooks, 1994)

1. Forewing gradates green 2
 1'. Forewing gradates black *C. defreitasi*
 2. Male arcessus only weakly decurved apically (Fig. 24I). *C. externa*
 2'. Male arcessus strongly decurved apically (Fig. 25E) *C. raimundoi*

***Chrysoperla defreitasi* Brooks, 1994**

DIAGNOSIS. — *Chrysoperla defreitasi* is closely related to *C. externa* and *C. raimundoi*. *Chrysoperla defreitasi* may be differentiated from the other two species by black gradate crossveins vs. green crossveins in *C. externa* and *C. raimundoi*.

HEAD. — Greenish yellow; red gena, lateral clypeus and lateral labrum; narrow red stripe on fronto-clypeal suture; antenna with scape and pedicel pale yellow, flagellum pale; maxillary palpi black, marked dorsally (Fig. 23C).

THORAX. — Yellowish green with yellow stripe on dorsal mid-line; Pronotum with narrow red-dish lateral stripe (Fig. 23A); meso- and metanota unmarked. **Wings:** Forewing venation mostly green with black gradates, cubital and anal veins black; forewing length (1.3 cm): width (0.37 cm) = ratio (3.5). Hindwing length (1.19 cm): width (0.37 cm) = ratio (3.22).

ABDOMEN. — Green with yellow stripe on mid-line. **Male:** long apodeme of tergite 9 forked on callus cerci; lip of sternite 8 + 9 short (Fig. 23E); many gonocristae; gonarcus large, arched; arcessus broad, tapered subapically, apex curved; gonosaccus with many gonosetae (Fig. 23F, G); tignum elongate, acumen long (Fig. 23D).

MATERIAL EXAMINED. — **Brazil:** Jaquaritingas, 15 November 1992, S. de Freitas, holotype male (MZ, USP), **São Paulo:** Jaboticabal, 7 August 1995, Seguin, L. D. (1♂); August 1996, Freitas, S. (1♀); 16 December 1998, Freitas, S. (1♂); **Mato Grosso:** Itiquira: 7 September 1999, Freitas, S. (5♂2♀)(rubber)(SDF/CAS).

***Chrysoperla externa* (Hagen, 1861)**

DIAGNOSIS. — This species can be separated from *C. defreitasi* by the dark gradate veins of the forewing in *C. defreitasi*, and from *C. raimundoi* by the male's more exaggerated curvature of the tip of the arcessus in *C. raimundoi*.

HEAD. — Vertex, greenish yellow, flattened with several transverse striations (Fig. 24A); frons and clypeus unmarked; gena with red spot not reaching ventral margin near maxillae; black dorsal marks on maxillary palpi (Fig. 24C); scape and pedicel pale yellow; flagellum basally pale and apically fuscous.

THORAX. — Green with yellow stripe on dorsal mid-line; pronotum with grayish latero-anterior spot; base of setae black (Fig. 24A); meso- and metanota without marks. **Wings:** Venation yellowish green (Fig. 24B); forewing length (1.23 cm): width (0.31 cm) = ratio (4.0). Hindwing length (1.19 cm): width (0.36 cm) = ratio (3.31).

ABDOMEN. — Greenish yellow with yellow stripe on dorsal mid-line, unmarked. **Male:** Tignum elongate, narrow with medial acumen small, triangular (Fig. 24E); gonarcus hardly curved; arcessus narrow, apex slightly curved; gonosaccus with many long gonosetae (Fig. 24I, J); numerous gonocristae (Fig. 24H). **Female:** Long subgenitale (Fig. 24G); spermatheca short (Fig. 24F).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Taiuva, 19 July 1990, Pazini, W. (6♂6♀)(orange); Jaboticabal, 10 August 1992, Freitas, S. (2♂)(guava); Taquaritinga, 7 January 1993 Freitas, S. (6♂1♀)(orange).

REMARKS. — *Chrysoperla externa* is probably the most common chrysopid in the Neotropical region and occurs associated with many graminous plants, apple trees, cotton, cantaloupe, eucalyptus, rubber and cashew nut.

Chrysoperla raimundoi de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Jaboticabal, SP, FCAV, 20-04-95, 1♂, Freitas, S."

DIAGNOSIS. — *Chrysoperla raimundoi* closely resembles *C. externa* and *C. defreitasi*. From *C. externa* it can be differentiated on cephalic characters: the vertex of *C. externa* is as long as wide and less striated. The head is also conspicuously different between them: *C. raimundoi* has a more elongate clypeus. The male genitalia also display some differences, e.g., the apex of the arcessus of *C. raimundoi* is quite curved and the gonosaccus bears longer gonosetae. *Chrysoperla defreitasi* can be differentiated from *C. raimundoi* by the smooth vertex, frons and red clypeus as well as the dark gradate veins of the forewing of *C. defreitasi*.

The name "raimundoi" is given in honor of Agricultural Engineer Raimundo José Ferreira who collected the type series.

HEAD. — Pale green; vertex raised with several transverse striations; diffuse red post-ocular spot; frons yellowish without marks, gena red throughout; dorsally black maxillary and labial palpi; scape and pedicel without marks (Fig. 25A).

THORAX. — Green with thick median yellow band; pronotum with lateral narrow reddish brown band not reaching the posterior corner. **Wings:** Venation green (Fig. 25B); forewing length (1.22 cm): width (0.40 cm) = ratio (3.02). Hindwing length (1.02 cm): width (0.31 cm) = ratio (3.29).

ABDOMEN. — Green with median yellow band. Tergite 9 + ectoproct apodeme branched below callus cerci; acumen of tignum, long slightly swollen apically; gonosaccus with numerous gonosetae; arcessus apex quite curved, lacking dorsal striation; gonarcus with narrow lateral arms; gonosaccus with numerous long gonosetae with crooked apices and ventral large gonocristae (Fig. 25C, D, E).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 8 June 1995, Ferreira, R. J. (5♂ paratypes)(guava), May 1995, Ferreira, R. J. (3♂ paratypes)(guava)(SDF/CAS).

Genus *Chrysopodes* Navás, 1913c

This is among the most diverse genera of New World Chrysopini. As with most genera in this tribe, the genus is usually defined by elements of the male genitalia, notably the lack of a tignum and gonapsis, presence of gonarcus with arcessus reduced to a curved, triangular, apically tapered sclerite. The ventral branch of the dorsal apodeme of the ectoproct is often acutely tapered apico-medially.

This is a New World genus distributed from south Florida, U.S.A. and Baja California, Mexico south to Argentina. The genus is usually divided into two subgenera (*Chrysopodes* and *Neosuarius* Adams and Penny, 1987) based principally on the shape of the adult mandibles. Members of *Chrysopodes* (*Chrysopodes*) have mandibles which are long and scythe-like, while members of *Chrysopodes* (*Neosuarius*) have mandibles which are considerably stouter than the nominate subgenus (Adams and Penny 1987). In most adult specimens, the mandibles are tucked under the labrum and difficult to see. The easiest way to view the mandibles is to separate the head from the body and macerate it in 10% KOH. Because this disarticulates the body and makes it more difficult to view other markings on the head, we have tried to avoid using mandibular characters in the species key. Most of the species of *C. (Neosuarius)* found west of the Andes in South America are dark in color, but species of *C. (Neosuarius)* found east of the Andes and in Central America are primarily green in color. Species of *C. (Chrysopodes)* generally have proportionally broader wings, a broader costal area, and longer forewing setae.

Brooks and Barnard (1990) listed 21 species in *C. (Chrysopodes)* and 11 species in *C. (Neosuarius)*; Penny (1998) added two more species of *C. (Chrysopodes)*, and Penny (2001) one additional species of *C. (Neosuarius)* from Costa Rica.

KEY TO THE SPECIES OF *CHRYSOPODES* OF BRAZILIAN AGRO-ECOSYSTEMS

- 1. Meso- and metanota with dark spots (Fig. 29A) 2
- 1'. Meso- and metanota without dark spots (Fig. 28A) 4
- 2. One pair circular spots (Fig. 29A) or completely pale (Fig. 28A) on mesonotum; frons mostly pale, at most with transverse dark stripe (Fig. 26C). 3
- 2'. Irregular spots forming partial stripe on mesonotum (Fig. 30A); clypeus, gena, part of frons and lateral margin of vertex red (Fig. 30C) *C. (C.) copia*
- 3. Antenna with flagellum black; dorso-medial stripe of scape incomplete, dark; two pair of lateral spots on pronotum; mesopraescutum completely pale (Fig. 29A); forewing without crossvein shading (Fig. 29B) *C. (C.) adynatos*
- 3'. Antenna with flagellum pale; dorso-medial stripe of scape reaching both proximal and apical margins; single pair of elongate dark spots on pronotum, extending onto anterior margin of mesopraescutum (Fig. 34A); forewing crossveins and gradates extensively shaded (Fig. 34B) *C. (C.) nigropicta*
- 4. Frons with semicircular red stripes below antennal pits (Fig. 26C) 8
- 4'. Frons without stripes (Fig. 32A) 5
- 5. Gena with two longitudinal dark stripes; clypeus and labrum laterally dark (Fig. 27D) 6
- 5'. Gena completely red; clypeus and labrum pale (Fig. 36C) 7
- 6. Apical forewing veins of male swollen (Fig. 27E); lateral arms of gonarcus longer than width between arms (Fig. 27H) *C. (C.) polygonica*
- 6'. Apical forewing veins of male not swollen (Fig. 26B); lateral arms of gonarcus shorter than width between arms (Fig. 32F) *C. (C.) delicata*
- 7. Scape with dark lateral spot (Fig. 36A); forewing with five inner and seven outer gradate veins (Fig. 36B); spermatheca short, with short, uncoiled spermathecal duct (Fig. 36E) *C. (N.) karinae*
- 7'. Scape without dark lateral spot (Fig. 26A); forewing with three inner and six outer gradate veins (Fig. 31A); spermatheca long and multiply-coiled, as is spermathecal duct (Fig. 31F) *C. (C.) crocinus*
- 8. Vertex and frons with dark marks between antennal bases (Fig. 33C) *C. (C.) elongata*
- 8'. Vertex and frons without dark marks between antennal bases (Fig. 26A) 9
- 9. Male ectoproct with two ventral projections (Fig. 35D) 10
- 9'. Male ectoproct with single ventral projection, which is an extension of the dorsal apodeme (Fig. 26I) *C. (C.) lineafrons*
- 10. Lateral arm of gonarcus longer than high (Fig. 27I); small ventral peg on sternite 8 + 9 (Fig. 26I) . . . *C. (C.) spinella*
- 10'. Lateral arm of gonarcus much higher than long (Fig. 35H); sternite 8 + 9 without ventral peg (Fig. 35D) *C. (C.) divisa*

Chrysopodes (Chrysopodes) lineafrons Adams and Penny, 1987

DIAGNOSIS. — Of the species with reddish bands below the antennae and dark palpi, *C. lineafrons* males can be recognized by the strongly arched apex to the ninth sternite, the single ventral projection from the ectoproct, and the triangular shape of the lateral arms of the gonarcus. Females can be recognized by the heavily-sclerotized knob at the apex of sternite 7.

HEAD. — Vertex glossy green with two red marks lateral to central raised area (Fig. 26A). Frons green with narrow red crescentic band below each antenna (Fig. 26C). Gena red, palest on central part. Distal maxillary palpmere black; fourth palpmere dorsally black. Distal labial palpmere black (Fig. 26C). Scape and pedicel greenish yellow, unmarked; flagellum pale.

THORAX. — Green with yellow stripe along mid-line. Pronotum with lateral suffused pale brown stripe (Fig. 26A). Meso- and metanota unmarked. **Wing:** Forewing venation mostly green with some transverse veins black, such as costal crossveins, R-Rs crossveins, base of Rs-Psm, inner and outer gradates and apices of anal veins (Fig. 26B). Length (1.4 cm): width (0.77 cm) = ratio 3.0. Hindwing

acute, venation green, except costal crossveins dark (Fig. 26B). Length (1.24 cm): width (0.39 cm) = ratio 3.18.

ABDOMEN. — Green with yellow stripe on dorsal mid-line. **Male:** Dorsal apodeme of tergite 9 + ectoproct heavily sclerotized with apical tooth projecting ventro-medially (Fig. 26I). Apex of sternite 9 with conical-based setae (Fig. 26E), ventrally, deeply concave on posterior half (Fig. 26I). Gonarcus narrow, strongly arched with long triangular lateral arms. Arcessus short, thin, evenly tapered to pointed apex, which has heavily-sclerotized basal apodemes (Fig. 26F, G). Gonosaccus simple sac. **Female:** Posterior margin of sternite 7 with heavily-sclerotized knob. Spermathecal duct short (Fig. 26H).

MATERIAL EXAMINED. — **Brazil: Amazonas,** Manaus, 17 February 1977, N. D. Penny, holotype male (deposited at INPA, Manaus), **São Paulo:** Jaboticabal, 14 January 1999, Freitas, S. (2♂2♀)(guava); 26 April 1999, Takahashi, K. (1♂)(orange)(CAS); São Jose do Rio Preto, 20 April 1997, Freitas, S. (1♂); Taquaritinga, 5 March 1994, Xavier, A. L. (1♀)(CAS).

Chrysopodes (Chrysopodes) polygonica Adams and Penny, 1987

DIAGNOSIS. — The male can be recognized by the swelling of the forewing apical gradates. Although males of other species of *Chrysopodes* have swollen veins, this usually involves the radial sector and associated veins more basal on the forewing. Only males of *C. polygonica* have an unswollen radial sector and swollen gradates and apical forks. The female also has a unique characteristic—a field of small setae on the knob at the apex of the seventh sternite.

HEAD. — Yellow with red and black markings. Gena with two black stripes continued onto lateral border of clypeus (Fig. 27C). Frons with small black spot close to gena. Vertex with postocular red spots at the posterior margin (Fig. 27A). Scape, pedicel and flagellum pale, unmarked. Maxillary and labial palpi black (Fig. 27C).

THORAX. — Green with yellow stripe on mid-line. Pronotum with pale brown stripe laterally (Fig. 27A). Meso- and metanotum without markings. **Wings:** Forewing venation green, except some costal crossveins, R-Rs crossveins, first five Rs-Psm crossveins, gradates and marginal forks dark. All transverse veins show at least a little shading. Apical gradate crossvein and apical branches of Rs swollen in male wings; female gradates normal. Forewing length (1.40 cm): width (0.47 cm) = ratio (2.98). Hindwing costal crossveins black; gradates black with brown shading (Fig. 27B). Length (0.86 cm): width (0.27) = ratio (3.18).

ABDOMEN. — Green with yellow stripe on mid-line. Tergites unmarked. **Male:** Sternite 8 + 9 with knob at mid-length and apical setae on conical bases (Fig. 27G). Ventro-caudal margin of ectoproct prolonged into an acute point. Large subanal plate densely setose. Gonarcus elongate, fragile, slender. Arcessus elongate, digitiform, apically decurved. Gonosaccus dorsally with few long gonosetae, and extended ventrally as lobe with numerous small setae (Fig. 27H, I). **Female:** Sternite 7 with terminal knob densely covered by small setae (Fig. 27F). Spermatheca bulbously inflated. Spermathecal duct short (Fig. 27J). Subgenitale with small rounded posterior lobes and no anterior prolongation (Fig. 27K).

MATERIAL EXAMINED. — **Brazil: Amazonas,** Manaus, Parque das Laranjeiras, 22 January 1981, J. R. Arias, holotype male (deposited at INPA, Manaus), **São Paulo:** Jaboticabal, 10 March 1999, Freitas, S. (1♂)(orange); 18 March 1998, Shinirara, A. (1♀); **Mato Grosso:** Itiquira, 14 December 1996, Scomparin, C. H. J. (1♀)(rubber); 11 January 1997, Freitas, S. (3♂1♀)(rubber); 13 January 1997, Freitas, S. (4♂1♀)(rubber)(SDF/CAS); 20 January 1997, Freitas, S. (1♀)(CAS); 23 February 1998, Freitas, S. (2♂3♀)(rubber).

Chrysopodes (Chrysopodes) spinella Adams and Penny, 1987

DIAGNOSIS. — The double ventral projections of the ectoproct appear to associate this species with *C. collaris* and *C. divisa* in *Chrysopodes (Neosuaris)* (Adams and Penny, 1987). However, *C. collaris* has a much broader body and neither of these species have the unique knob at mid-length on the ninth sternite. *Chrysopodes (Chrysopodes) lineafrons* has both subantennal red bands and knob at mid-length of the ninth sternite, but has only a single ventral projection of the ectoproct. Females of these four species can be separated only with great difficulty.

HEAD. — Yellow with red markings. Vertex glossy with red postocular spot from hind margin forward only to mid-length (Fig. 28A). Frons yellow with interrupted red band extending from eye margin medially below antennal sockets. Gena red. Maxillary distal palpmere black, fourth palpmere dorsally black and third darkened. Labial distal and basal palpimeres black. Scape and pedicel yellow, unmarked; flagellum stramineous (Fig. 28A, D).

THORAX. — Green with yellow stripe on mid-line. Pronotum longer than wide, with stripe dorsolaterally. Meso- and metanotum unmarked (Fig. 28A). **Wings:** Wing venation mostly green, including pterostigma. Forewing costal crossveins, basal R-Rs crossveins anterior and posterior intersections, origin of Rs, gradates, marginal forks and anterior ends of Psm-Psc all dark (Fig. 28B); forewing length (1.21 cm): width (0.41 cm) = ratio (2.95). Hindwing with costal crossveins and gradates dark (Fig. 28B). Length (1.06 cm): width (0.34 cm) = ratio (3.12).

ABDOMEN. — Green. **Male:** Dorsal apodeme of ectoproct with two ventral projections. Ninth sternite with small knob at mid-length. Gonarcus strongly arched horizontally, but with little vertical arch. Lateral arms of gonarcus elongate and apically rounded. Arcessus short, triangular (Adams and Penny 1987). **Female:** Spermatheca elongate with vela in form of crooked coil. Bursal duct elongate and multiply coiled (Fig. 28D).

MATERIAL EXAMINED. — **Brazil: Pará,** São Geraldo, 30 November to 8 December 1982, J. R. Arais, holotype male (deposited at INPA, Manaus), **São Paulo:** Jaboticabal, February 1992, Scomparin, C. H. J. (1 ♀)(orange).

Chrysopodes (Chrysopodes) adynatos de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, 12-VII-96 Scomparin, C. H. J." (rubber).

DIAGNOSIS. — Only two other species of *Chrysopodes* in the region have dark spots on the mesonotum. However, the spots on the other species are more diffuse and not as well delimited. The thin central arch of the gonarcus is also distinctive, as are the dark antennae.

The name "adynatos" is taken from the Greek meaning weak, or without strength, and refers to the thin medial arch of the gonarcus in this species.

HEAD. — Yellow. Gena, frons and vertex without marks. Scape with mid-dorsal, tapered black spot; pedicel and flagellum black.

THORAX. — Pronotum pale yellow, with two pairs of black marks, each pair appears as short lateral stripe (Fig. 29A). Mesonotum with pair of rounded black spots on scutum (Fig. 29A). Metanotum unmarked. **Wings:** Forewing venation green, except costal crossveins, R-Rs crossveins, first Rs-Psm veins; Psm-Psc crossveins and first two unforked marginal veins dark (Fig. 29B). Length (1.3 cm): width (0.45 cm) = ratio (3.25). Hindwing venation green. Length (1.18 cm): width (0.34 cm) = ratio (3.47).

ABDOMEN. — Yellow, unmarked. **Male:** Genitalia weakly sclerotized. Gonarcus thin with lateral projections similar to gonocornua but originate from lateral arms of gonarcus. Arcessus longer than wide, with broad medial decurved hook. Gonosaccus with long setae (Fig. 29C, D).

MATERIAL EXAMINED. — Known only from the holotype.

Chrysopodes (Chrysopodes) copia de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Jaboticabal, SP; FCAV Macadamia; 12/11/94; Freitas, S. SP70.”

DIAGNOSIS. — The most distinctive characteristic of this species is the almost completely red coloration of the frons, as well as the extensive red coloration on meso- and metanota. The red coloration of the frons would appear to be an exaggerated extension of the transverse red bands found in several other species. However, these other species have dark palpi, not pale palpi as in this species.

This species appears most closely associated with *C. (Chrysopodes) indentata* Adams and Penny, 1987, because of the pale palpi and especially the short, broad gonarcus and arcessus. However, they can be separated because *C. (Chrysopodes) copia* has the almost completely red frons and clypeus, the ventral bump at mid-length of the male ninth sternite is not as developed, and the gonarcus is more laterally arched.

The name “*copia*” comes from the Latin for abundance or plenty and refers to the similarity to *C. indentata*.

HEAD. — Golden yellow with red markings. Clypeus, frons and gena completely red, except for restricted area below antennae sockets and between anterior tentorial pits (Fig. 30C). A red stripe runs from gena to posterior eye margin laterad of antennal sockets (Fig. 30A). Vertex yellow, except laterally close to eye margin red. Scape, pedicel and flagellum pale without marks. Maxillary and labial palpi pale, unmarked.

THORAX. — Slightly greenish yellow. Pronotum with diffuse red lateral stripes continuing onto meso- and metanotum (Fig. 30A). **Wings:** Forewing green with some crossveins totally or partially dark, such as posterior junctions of costal crossveins, R-Rs endings, Rs-Psm endings, inner and outer gradates, Psm-Psc crossveins, apex of marginal forked and unforked crossveins; and apical Psm-Psc crossveins shaded (Fig. 30B). Length (1.27 cm): width (0.43 cm) = ratio (2.95). Hindwing venation mostly green, except costal crossveins at subcostal juncture and outer gradates dark. Length (1.18 cm): width (0.36 cm) = ratio (3.28).

ABDOMEN. — Slightly greenish yellow, unmarked. **Male:** Ventral branch of dorsal apodeme of tergite 9 + ectoproct quite large (Fig. 30D). Sternite 8 + 9 with knob on ventro-medial area (Fig. 30D). Gonarcus evenly curved horizontally, barely curved vertically; lateral arms with long dorsal plate, slightly upturned apically (Fig. 30F, G). Arcessus short, broader than long, with a field of quite short setae distally on medial apex. Gonosaccus bearing scattered long setae dorsally and field of many small setae ventrally. **Female:** Spermatheca vela twice coiled, then extended as a convoluted coil. Bursal duct short, twisted (Fig. 30H); subgenitale bilobed without medial projection (Fig. 30E).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 22 January 1994, Freitas, S. (1♂ paratype)(on macadamia)(CAS); 22 February 1994, Freitas, S. (3♂1♀ paratypes)(corn); 22 February 1995, Freitas, S. (1♀ paratype)(guava)(CAS); 22 March 1995, Freitas S. (2♀ paratypes)(corn); 10 December 1996, Freitas, S. (1♂ paratype)(corn); Ribeirão Preto, October 1995, Pinotti, F. (2♀ paratypes); Bebedouro, 14 October 1995, Fonseca, C. (1♂ paratype); Birigui, 11 July 1994, Scomparin, C. H. J. (1♂ paratype)(corn).

Chrysopodes (Chrysopodes) crocinus de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Birigui, SP, 21-II-96, Scomparin, C. H. J.” (corn).

DIAGNOSIS. — The most distinctive feature of this species is the lack of dark or red markings on head and thorax. The male gonarcus is similar to most species in the genus. However, a few features set this species apart. The dark antennal flagellum is found only in two other species of *C. (Chrysopodes)*—*C. (C.) adynatos* and *C. (C.) victoriae*—both of which have dark or red markings on

the thorax. Several South American species of *C. (Neosuarius)* have dark antennae, but again there are extensive dark markings on both the head and thorax, as well as dark maxillary palpi.

There appears to be no ventro-medial point to the male ectoproct of *C. (C.) crocinus*, unlike most species in this genus. (This character state could develop late in the maturation of the emerged adult). Most distinctive is the basal point on the male sternite 8 + 9. Less easily discernible are the hirsute tip of the arcessus and the two small patches of gonosetae on the gonosaccus.

The name "crocinus" comes from the Latin for saffronlike, referring to the coloration of the antennal scape and pedicel.

HEAD. — Yellow. Frons, clypeus and vertex pale yellow, unmarked. Gena slightly darkened. Scape, pedicel and basal membrane yellow-orange, without marks; flagellum black. Vertex without postocular marks. Labial and maxillary palpi pale.

THORAX. — Green with a pale stripe on mid-line. Pro-, meso- and metathorax unmarked. **Wings:** Forewing venation green, except costal crossveins and R-Rs crossveins somewhat darkened. Intramedian cell ovate, with swollen base. Base of Psc near intramedian cell swollen with many microtrichiae (Fig. 31C). Pterostigma unmarked. Length (1.18 cm): width (0.41) = ratio (2.88). Hindwing acute; venation green; stigma unmarked. Length (1.12cm): width (0.35 cm) = ratio (3.20)(Fig. 31A).

ABDOMEN. — Green with yellow stripe on middle line. Tergites unmarked. **Male:** Dorsal apodeme of ectoproct not apically forked. Sternite 8 + 9 with knob near anterior margin (Fig. 31B). Arcessus short, straight, triangular with dorsal setae most abundant. Gonosaccus with two groups of three setae, each with large conical base. Gonarcus wider than long, with thin, broadly lobate, parallel arms (Fig. 31D, E). **Female:** Sternite 7 with apical knob-like projection (Fig. 31G). Spermatheca long, coiled. Spermathecal gland and bursal accessory glands long, coiled (Fig. 31F). Subgenitale saccate (Fig. 31H).

OTHER MATERIAL EXAMINED. — **Brazil:** São Paulo: Birigui, 2 February 1996, Scomparin, C. H. J. (2♂1♀ paratypes).

Chrysopodes (Chrysopodes) delicata de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, Seringueira, PEM-507, 31/12/96 Scomparin, C. H. J. Armadilha—melaco" (rubber).

DIAGNOSIS. — The double dark genal stripes, lack of subantennal bands, and dark palpi link *C. delicata* with *C. polygonica*. However, males of *C. polygonica* have much longer lateral arms of the gonarcus and swollen gradate and apical endings of forewing veins.

The name "delicata" comes from the Latin for delicate, tender, or dainty, and refers to the small size of the gonarcus.

HEAD. — Yellow. Frons and vertex pale yellow, unmarked. Gena with two large black stripes continuing onto margin of clypeus (Fig. 32A, C). Maxillary palpimeres 1–4 and half of fifth black. Scape, pedicel and flagellum pale (Fig. 32A). Mandibles scythe-like (Fig. 32E).

THORAX. — Green with yellow stripe on mid-line. Pro-, meso-, and metanotum unmarked. **Wings:** Forewing green, except most crossveins dark and with slight shading; gradates more shaded than other crossveins. Pterostigma green, unmarked. Forewing length (1.10 cm): width (0.38 cm) = ratio (2.89). Hindwing costal crossveins, gradates and origin of marginal forks dark (Fig. 32B). Length (0.96 cm): width (0.29 cm) = ratio (3.31).

ABDOMEN. — Green with yellow stripe on mid-line. Tergites unmarked. **Male:** Posterior margin of ectoproct with long setae on thick bases. Sternite 8 + 9 with large knob at midlength and narrowed apex (Fig. 32D). Male genitalia lightly sclerotized. Lateral arms of gonarcus reduced to tiny plates.

Arcessus more sclerotized than other genital structures; apex smooth, without setae, decurved. Gonosaccus with field of long setae (Fig. 32F,G).

MATERIAL EXAMINED. — Known only from the holotype.

Chrysopodes (Chrysopodes) elongata de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil “Luiz Antonio, SP, Faz. Guatapara, 29-IV-94, Freitas, S.” (eucalyptus).

DIAGNOSIS. — This species is a member of a group of species with interrupted transverse band across the frons and dark palpi. *Chrysopodes elongata* can be separated from *C. lineafrons* and *C. spinella* by the small dark spots between the antennal bases. Additionally, females can be separated by the long, narrow sternite 7 with no knobs, and especially by the long, thin spermatheca.

The name “*elongata*” comes from the Latin for prolonged, and refers to the long and narrow spermatheca.

HEAD. — Yellow, marked with red. Frons yellow with narrow, medially interrupted, transverse red line below antenna sockets; transverse line continued along ocular margin to posterior margin of vertex. Gena red. Tiny red spot between antenna on frons and anterior part of vertex. Scape, pedicel and flagellum pale. Fourth maxillary palpmere and half of fifth palpmere dark. Labial palpimeres dark (Fig. 33A, C).

THORAX. — Green with yellow stripe on mid-line. Cervical sclerite red. Pronotum with pale brown stripe dorso-laterally (Fig. 33A). Meso- and metanotum unmarked. **Wing:** Venation green, except costal crossveins, R-Rs crossveins, gradates, origin of Rs, Rs-Psm crossveins and marginal forks dark (Fig. 33B). Forewing pterostigma unmarked. Length (1.10 cm): width (0.38 cm) = ratio (2.89). Hindwing costal crossveins and gradates dark. Length (0.97 cm): width (0.30 cm) = ratio (3.23).

ABDOMEN. — Green with yellow stripe on mid-line. Tergites without markings. **Female:** Sternite 7 narrowed at apex. Spermatheca slender; duct extends as thin, filamentous tube to bursa copulatrix (Fig. 33D, F). Subgenitale with small, medial projection (Fig. 33G).

MATERIAL EXAMINED. — Known only from the holotype.

Chrysopodes (Chrysopodes) nigropicta de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo Brazil, labeled “Bra-MT-Itiquira, P. E. Michelin; 18/VIII/98, Freitas, S. 78A” (rubber).

DIAGNOSIS. — The black marks on pro- and mesonotum are unusual, as is the heavy shading of forewing crossveins. Of the species having dark markings on the mesonotum, *C. adynatos* has dark antennae and well delimited dark mesonotal spots. Although *C. indentata* also has pale antennae, the dark markings of pro- and mesonotum are not found in this species. However, the two species appear related because they both have an exceptionally heavily-sclerotized spermathecal duct.

The name “*nigropicta*” comes from the Latin *nigra* for black or dark and *pictus* for painted or colored, referring to the dark markings of pro- and mesonota.

HEAD. — Greenish yellow. Vertex green, unmarked. Frons, clypeus and gena yellow. Scape yellow with mid-dorsal black stripe; pedicel and flagellum pale. Maxillary and labial palpi pale (Fig. 34A).

THORAX. — Green; pronotum with lateral black stripes from middle to posterior margin. Mesonotum with pair of dark spots laterally on prescutum and second pair of lateral circular spots on middle of scutum. Metanotum unmarked (Fig. 34A). **Wings:** Forewing veins green, with costal crossveins, R-Rs crossveins, first Rs-Psm crossvein, gradates, Psm-Psc crossveins after intramedian cell, apex of marginal forks, anterior marginal unforked veins and endings of anal veins dark. Almost all crossveins in posterior half of forewing heavily shaded. Length (1.41 cm): width (0.5 cm) = ratio

(2.83). Hindwing venation mostly green, except middle part of Rs and gradates dark (Fig. 34B). Length (1.24 cm): width (0.40 cm) = ratio (3.10).

ABDOMEN. — Greenish yellow. **Female:** Spermatheca U-shaped. Spermathecal gland with distal part exceptionally heavily sclerotized. Bursa sac-like, with two accessory glands (Fig. 34C).

MATERIAL EXAMINED. — Known only from the holotype.

Chrysopodes (Neosuarius) divisa (Walker, 1853)

DIAGNOSIS. — This is one of several species which has medially interrupted, red bands across the frons below the antennae. The double ventral projection of the ectoproct and tiny setae at the tip of the arcessus can be found in the closely related *C. collaris* (Schneider, 1851). However, *C. collaris* is a larger, thicker-bodied species with pronotum much wider than long; the apex of the sternite 8 + 9 is truncated and vertically thick, and the gonarcus + arcessus complex has an H-shaped supporting brace not found in *C. divisa* (see Adams and Penny 1987).

HEAD. — Yellow with red markings. Vertex with red lateral postocular marks from mid-length to posterior margin. Frons yellow with red band below antennal bases interrupted along mid-line. Gena red. Maxillary distal palpmere black; fourth palpmere dorsally black; and third fuscous. Third labial palpmere black. Scape and pedicel yellow, unmarked; flagellum pale yellow (Fig. 35A, C).

THORAX. — Green with yellow stripe on mid-line. Pronotum longer than wide, with weakly defined brown stripe laterally. Meso- and metanotum unmarked (Fig. 35A). **Wings:** Venation green, except costal crossveins, origin of Rs, R-Rs crossveins, gradates; Psm-Psc crossvein endings; and bifurcations of forked marginal veins dark. Pterostigma green, unmarked. Length (1.14 cm): width (0.39 cm) = ratio (2.92). Hindwing venation green except gradates and middle costal crossveins dark (Fig. 35B). Length (0.88 cm): width (0.28 cm) = ratio (3.14).

ABDOMEN. — Green, with mid-line yellow. Tergites without markings. **Male:** Tergite 9 + ectoproct triangularly angled at postero-ventral margin, with basal lobe and apico-medially projecting hook (Fig. 35D). Sternite 8 + 9 deeply constricted posteriorly, without knob, with lateral setae with thick bases. Gonarcus mildly arched, with oblong, curved lateral arms. Arcessus evenly tapered, triangular, with apex decurved and bearing tiny setae (Fig. 35G, H). **Female:** Dorsally folded bursa with pair of ovate accessory glands. Long bursal duct extended into long and narrow spermatheca (Fig. 35E, F). Subgenitale broader than long, with small medial projection.

MATERIAL EXAMINED. — **Brazil: São Paulo:** Taquaritinga, 6 August 1993, Xavier, A. L. Q. (1♂)(orange); 8 January 1993, Xavier, A. L. Q. (1♂)(orange); 5 March 1994, Xavier, A. L. Q. (4♂1♀)(orange)(SDF/CAS); 19 November 1992, Freitas, S. (2♀)(orange); 10 January 1994, Xavier, A. L. Q. (1♀)(orange); 5 March 1994, Xavier, A. L. Q. (14♀)(orange); Monte Azul Paulista, November 1994, Silva, J. L. (1♂)(orange); Barretos, 11 February 1991, Freitas, S. (1♂)(orange); Jaboticabal, 20 August 1995, Freitas, S. (1♀); Luiz Antonio, 21 December 1994, Freitas, S. (1♀)(eucalyptus); Elisario, July 1994, Silva, J. L. (1♀)(orange); **Minas Gerais:** Peti, October 1988, coll. not named (1♂).

Chrysopodes (Neosuarius) karinae de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Bra-SP-Jaboticabal, FCAV, 24/IV/99, Takahashi, K. M., 82♀" (guava).

DIAGNOSIS. — This species is unlike other green species of *Chrysopodes (Neosuarius)* in having antennae with dark flagella, scapes with lateral mark, and labial and maxillary palpi pale. It can also be separated from *C. collaris* by having a pronotum as long as wide (Adams and Penny 1987). However, the most unique characteristic of this species is the subanal plate with numerous small setae and lateral pockets, which is found in no other species. The spermatheca is also thinner and more elongate than

most species. The spermathecae shape, long and crooked, the setae around the genitalia atria and the lateral pocket are not found in any other chrysopid species.

The name was given in honor of Agricultural Engineer Karina Manami Takahashi, enthusiastic entomologist who has studied and collected many chrysopids.

HEAD. — Golden yellow with red markings. Frons and clypeus unmarked. Gena red-tinged. Vertex with red spots on posterior margin near eyes. Scape yellow with dark spot at dorso-lateral apex; pedicel and flagellum dark (Fig. 36A, C). Maxillary and labial palpi pale.

THORAX. — Yellow. Pronotum with lateral pale brown stripe (Fig. 36A). Meso- and metanotum unmarked. **Wings:** Forewing venation green, except margin endings costal crossveins, R-Rs crossveins and gradates dark. Length (1.45 cm): width (0.5 cm) = ratio (2.9)(Fig. 36B). Hindwing venation green. Length (1.33 cm): width (0.43 cm) = ratio (3.09).

ABDOMEN. — Yellow, marked red laterally on first tergite. **Female:** Tergite 8 ventrally-prolonged laterally. Tergite 9 + ectoproct dorsally raised. Sternite seven with ventral knob apically (Fig. 36D). Proximal to genital atria a dorsal field of setae, a medial plate with densely clumped setae and two lateral pockets (Fig. 36F). Spermatheca elongate, twisted but not coiled, with long duct connected to bursa copulatrix. Bursa a membranous sac with pair of ovate accessory glands (Fig. 36E). Subgenitale simple, apically bilobed.

OTHER MATERIAL EXAMINED. — **Brazil:** São Paulo, Jaboticabal, 24 April 1999, Takahashi, K. M. (1 ♀ paratype)(guava).

Genus *Plesiochrysa* Adams, 1982b

Plesiochrysa adults are among the largest of South American Chrysopini, with forewing length of about 15 to 18 mm. They can usually be found in open fields, and at times can be quite common. Their male genital elements indicate a close relationship with the Holarctic genus *Chrysopa*. Brooks and Barnard (1990) listed 23 species in this genus, distributed in the Neotropics, Australia, Malay Archipelago, southern India to the Seychelles. Three species have been found during this study, including one new species. Unfortunately, male genital elements of all Brazilian species are virtually identical, but the species can be identified using the following key.

KEY TO THE SPECIES OF *PLESIOCHRYSA* FOUND IN BRAZILIAN AGRO-ECOSYSTEMS

- 1. Antennae dark (Fig. 39A) *P. alytos*
- 1'. Antennae pale (Fig. 37A). 2
- 2. Pronotum longer than wide; lateral stripes continuous or only slightly interrupted (Fig. 38A) *P. elongata*
- 2'. Pronotum as wide as long; lateral spots widely separated (Fig. 37A) *P. brasiliensis*

***Plesiochrysa brasiliensis* (Schneider, 1851)**

DIAGNOSIS. — *Plesiochrysa brasiliensis* can be separated from the other two Brazilian species (*P. elongata* and *P. alytos*) by the dark antennal flagellum of *P. alytos* and longer pronotum with more continuous lateral red markings of *P. elongata*.

HEAD. — Yellow with red marks. Vertex yellow with small red spots on posterior part near eye margin (Fig. 37A). Frons unmarked. Gena with narrow red stripe close to frons continued onto lateral margin of clypeus (Fig. 37C). Maxillary palpi with dorsal black stripe. Labial palpi pale, unmarked. Scape and pedicel pale, unmarked; flagellum pale yellow.

THORAX. — Green with pale yellow stripe on mid-line. Pronotum marked with pair of well-delimited red spots laterally (Fig. 37A). Meso- and metanota unmarked. **Wings:** Forewing venation green, except posterior junctions of costal crossveins 3–7 and 8–13, origin of Rs, R-Rs crossveins

1–4, gradates, Psm-Psc crossveins, marginal unforked veins near anals and apices of anal veins dark (Fig. 37B). Length (1.5 cm): width (0.5 cm) = ratio (2.98). Hindwing venation green, except outer gradates dark (Fig. 37B). Length (1.30 cm): width (0.43 cm) = ratio (3.02).

ABDOMEN. — Green with yellow stripe on mid-line. **Male:** Tergite 9 + ectoprocts widely separated with medial indentation (Fig. 37D). Sternite 8 + 9 elongate, narrowed at apex (Fig. 37E). Tignum narrow, transverse band. Gonarcus wide and thick with small, medial gonocornua. Entoprocessus not fused to gonarcus, Y-shaped. Arcessus absent. Pseudopenis elongate, tapering, apically decurved. Gonosaccus large with numerous long setae on tubercles (smaller near pseudopenis) (Fig. 37G, H). **Female genitalia:** Spermatheca short. Bursa sac-like (Fig. 37F). Subgenitale with lateral lobes and small median projection.

MATERIAL EXAMINED. — **BRAZIL: São Paulo:** Jaboticabal, November 1991, Hungaro, C. M.; 24 October 1992, (1♀); Tanigawa, F. (1♀); October 1992, Mendes, M. B. (1♀); October 1992, Tannuri, L. (1♂); 5 November 1992, Scomparin, C. H. J. (1♀)(orange); 22 November 1994, Freitas, (1♂)(guava); 30 June 1995, Freitas, S. (1♂); 26 January 1995, Freitas, S. (1♂); 22 February 1995, Freitas, S. (1♂1♀)(orange); 24 February 1996, Rossi, R. M. (1♀); 28 August 1996, Silva, L. C. (1♂); 20 October 1996, Freitas, S. (1♂)(guava)(CAS); 21 October 1996, Fernandes, M. (1♀); 20 October 1996, Freitas, S. (2♂)(orange); 9 December 1996, Freitas, S. (1♂)(orange)(CAS); 17 June 1998, Freitas S. (1♂); Birigui, 26 January 1996, Scomparin, C. H. J. (1♂1♀)(corn); Atibaia, 15 November 1994, Onara, L. (1♀); Eng. Coelho, 10 August 1996, Poletti, M. (1♂); Matão, 15 October 1996, Yiagi, R. (1♂); Olimpia, 2 August 1996, Tolfo, A. L. T. (1♂).

Plesiochrysa elongata (Navás, 1913b)

DIAGNOSIS. — This species can be separated from *P. alytos* by its pale antennae and pale gradate crossveins, and from *P. brasiliensis* by its longer pronotum with more complete stripes.

HEAD. — Yellow with red markings. Vertex yellow with tiny red spots beside eye at posterior margin. Frons unmarked. Gena with red stripe on half closest to frons, not extended onto clypeus (Fig. 38A, C). Maxillary palpi with dorsal black stripe. Labial palpi unmarked. Scape, pedicel and flagellum pale yellow, unmarked.

THORAX. — Green with pale yellow stripe on mid-line. Pronotum marked with red stripe narrowed or interrupted at midlength. Meso- and metanota unmarked (Fig. 38A). **Wings:** Venation and size similar to *P. brasiliensis*.

ABDOMEN. — Male and female as *P. brasiliensis*.

MATERIAL EXAMINED. — **BRAZIL: São Paulo:** Jaboticabal, October 1993, Furuhashi, S. (1♂); 10 October 1996, Ferreira, A. (1♂); 15 November 1996, Freitas, S. (1♀)(corn)(CAS); October 1993, Fernandes, F. (1♀); **Minas Gerais:** Viçosa, 28 December 1988, Abrantes, C. V. M. (1♂1♀); 27 January 1989, Abrantes, C. V. M. (2♂)(SDF/CAS); 28 February 1988, Abrantes, C. V. M. (1♂); **Mato Grosso:** Itiquira, 10 September 1996, Scomparin, C. H. J. (1♀)(rubber).

Plesiochrysa alytos de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, PEM, 7-IX-99, Freitas, S." (guava).

DIAGNOSIS. — This is the only species of *Plesiochrysa* in South America which has a continuous pronotal band, showing no signs of restriction or broken lines at mid-length. In the other species, occasional specimens will appear to have stripes rather than spots, sometimes because of pigment "bleeding," but there is virtually always an indication of restriction at mid-length. This is also the only species with dark antennae.

This name "alytos" comes from the Greek, meaning continuous or unbroken, and refers to the continuous, unbroken, lateral stripes on the pronotum.

HEAD. — Yellow with red markings. Vertex yellow with small red spots beside eye at posterior margin (Fig. 39A). Frons and clypeus unmarked. Gena red-tinged. Maxillary palpi with dorsal black stripe. Labial palpi unmarked (Fig. 39C). Scape and pedicel unmarked, flagellum black basally and fuscous apically (Fig. 39A).

THORAX. — Greenish yellow. Pronotum longer than wide, glabrous, with pale red lateral stripe. **Wings:** Venation green, except darkened gradates in fore- and hindwings (Fig. 39B). Forewing length (1.56 cm): width (0.49 cm) = ratio (3.18). Hindwing length (1.40 cm): width (0.43) = ratio (3.26).

ABDOMEN. — Greenish yellow. Male and female genitalia, as in *P. brasiliensis*.

OTHER MATERIAL EXAMINED. — **BRAZIL: São Paulo:** Jaboticabal, November 1996, Manzini, J. P. (1 ♀ paratype); 1 November 1990, Camargo, R. (1 ♂ paratype); 13 November 1994, Lopez, C. C. (1 ♂ 1 ♀ paratypes)(SDF/CAS); 12 September 1995, Gomes, R. G. (1 ♂ paratype); 20 November 1995, Ferreira, R. J. (1 ♂ paratype); 12 September 1996, Britto, L. F. (1 ♀ paratype)(CAS); 4 December 1996, Freitas S. (1 ♀ paratype); Birigui, 26 January 1996, Scomparin, C. H. J. (1 ♀ paratype)(corn); Pirangi, 15 December 1996, Fernandes, E. (1 ♂ paratype); Franca, October 1990, Cunha, L. S. A. (1 ♂ paratype); **Mato Grosso:** Itiquira, 4 November, 1996, Scomparin, C. H. J. (1 ♂ paratype)(rubber); 7 September 1996, Freitas, S. (1 ♂ paratype)(rubber).

TRIBE LEUCOCHRYSINI ADAMS, 1978

Adult members of the tribe Leucochrysinini are distinctive. They have a dark spot along the anterior margin of the forewing at the base of the pterostigma, a rather low angle of juncture between the pseudomedia and the outer gradate series of crossveins, and antennae which are longer than the wings. Males have a broad gonarcus which is only weakly arched and lacks entoprocesses. Female genitalia often include an elongate subgenitale, which is likely the precursor for a praegenitale (Brooks and Barnard 1990).

This tribe is only found in the New World, ranging from as far north as Iowa and Massachusetts in North America (Penny et al. 1997) south to Argentina (Penny 1978). Members of Leucochrysinini are found primarily in tropical forests where they are the dominant tribe in this habitat. *Leucochrysa*, with its two subgenera, is the most speciose genus of the family. Leucochrysinini consists of seven genera, and is most diverse in South America. All genera are known from Brazil, except *Neula*, which is known only from its type specimen collected in Colombia. All known larvae are trash-bearers, known locally as "bicho de lixo." Probably because of their preference for forest habitat, only *Leucochrysa* has been collected in Brazilian agro-ecosystems.

Genus *Leucochrysa* McLachlan, 1868

Much of what has been said about Leucochrysinini applies equally well to *Leucochrysa*. It is the largest genus in the family with nearly 170 described species and many still undescribed. Like the tribe, *Leucochrysa* is distributed from northern U.S.A. to Argentina, although the greatest diversity and numbers occur in the tropical forests. Within the tribe, *Leucochrysa* is currently delimited by the lack of diverse derived character states of the other genera. A phylogenetic analysis of the tribe will probably split *Leucochrysa* into several lineages. As currently constituted, *Leucochrysa* has two subgenera. Adults can be distinguished using the following key.

KEY TO THE SUBGENERA OF *LEUCOCHRYSA*

1. Forewing intramedian cell quadrangular, Rs straight (Fig. 40A) *L. (Leucochrysa)*
 1'. Forewing intramedian cell triangular, Rs sinuous (Fig. 47B) *L. (Nodita)*

Subgenus *Leucochrysa (Leucochrysa)* McLachlan, 1868

This subgenus is usually characterized by having forewings with a quadrate intramedian cell, rather than an ovate or triangular one, and straight radial sector rather than sinuous. However, as is frequently pointed out (Banks 1945; Adams 1977; Brooks and Barnard 1990), a small percentage of individuals of either subgenus will have the shape of the intramedian cell of the other subgenus. Individuals of *Leucochrysa (Leucochrysa)* are large, with a forewing length of more than 20 mm and at times more than 30 mm. The shape of the intramedian cell may in part be correlated with large wing size, although large species of *Leucochrysa (Nodita)* maintain a triangular shape. The shape of the forewing radial sector is also probably an artifact of larger wings of *Leucochrysa (Leucochrysa)*, as larger species of *Leucochrysa (Nodita)* also appear to have a straighter Rs. Brooks and Barnard (1990) recorded 41 species in *Leucochrysa (Leucochrysa)* distributed from northern U.S.A. to Argentina. Seven species are recorded here, two were previously undescribed. Adults can be distinguished using the following key.

KEY TO SPECIES OF *LEUCOCHRYSA (LEUCOCHRYSA)* FOUND IN BRAZILIAN AGRO-ECOSYSTEMS

1. Two longitudinal dark stripes on meso- and metanota; pronotum with two red spots near posterior margin (Fig. 41A) *L. (L.) boxi*
 1'. Meso- and metanota pale or dark, but without longitudinal stripes; pronotum pale green without markings (Fig. 40C). 2
 2. Head, thorax and abdomen without markings. *L. (L.) catarinae*
 2'. Head with thick red markings and suffusions (Fig. 40B, C); abdomen with large dark marks on Tergites 5 and 6 (Fig. 40D). 3
 3. Dark spot at base of forewing intramedia vein (Fig. 40A) 4
 3'. No dark spot at base of forewing intramedia vein (Fig. 44A) 5
 4. Frons suffused with red (Fig. 43D); female spermatheca coiled about five times, with short spermathecal duct (Fig. 43E) *L. (L.) varia*
 4'. Frons pale, without markings (Fig. 40B); female spermatheca short, S-shaped, with long spermathecal duct coiled dozens of times (Fig. 40E). *L. (L.) ampla*
 5. Male gonocornua short, separated by more than five times their length (Fig. 44D) *L. (L.) walkeriana*
 5'. Male gonocornua longer, separated by less than twice their length (Fig. 42D). 6
 6. Lateral arms of male gonarcus oriented vertically; inner margins of gonocornua diverging (Fig. 42D). *L. (L.) pretiosa*
 6'. Lateral arms of male gonarcus oriented at 45° to vertical; inner margins of gonocornua parallel (Fig. 45C) *L. (L.) bruneola*

Leucochrysa (Leucochrysa) ampla (Walker, 1853)

DIAGNOSIS. — This is a member of a group of species having heavy red markings and red pigmentation suffused over the frons and vertex, no markings on the pronotum, general (but variable) dark suffusion of the meso- and metascuta, and dark marks on the 5th and 6th abdominal tergites. Within this group, *L. ampla* can be separated from all others, except *L. varia*, by the dark spot at the base of the intramedian cell. From *L. varia* it is separated by distinctly different female genitalia: *L. varia* having a long, multiply coiled spermatheca and short, uncoiled spermathecal duct, while *L. ampla* has an S-shaped spermatheca and long spermathecal duct coiled three to four dozen times.

HEAD. — Pale yellow, broadly tinged reddish brown; vertex reddish along posterior ocular margin, lateral of raised medial area and base of antenna; frons dark brown between scape and eye and through antennal sockets to ventral margin with gena; gena dark brown at frons and clypeus and otherwise red; scape light red-tinged throughout; flagellum pale, basal segments fuscous; maxillary and labial palpi pale (Fig. 40B).

THORAX. — Cervical sclerites red; pronotum pale yellow, unmarked; most of meso- and metanota dark red and chocolate brown (Fig. 40C). **Wings:** Pterostigma marked with prominent dark brown spot. Forewing bases of longitudinal veins dark brown; outer gradates with conspicuous brown spots; inner gradates brownish; most costal cross veins brown at apex; base of Rs and ventral corner of intramedian cell brown with bordering; marginal forks of veins brown at apex. Length (2.11 cm): width (0.83 cm) = ratio (2.54). Hindwing veins predominately pale, only costal crossveins brown (Fig. 40A). Length (1.87 cm): width (0.63 cm) = ratio (2.97).

ABDOMEN. — Yellowish green with a broad yellow stripe along dorso-medial line; tergites 5 and 6 dark brown (Fig. 40D). **Female genitalia:** Spermatheca long; spermathecal duct long, convoluted; subgenitale bears extra plate with pit; long accessory glands (Fig. 40 E, F).

MATERIAL EXAMINED. — **BRAZIL:** Mato Grosso: Itiquira, 13 January 1997, Freitas, S. (1 ♀)(rubber).

Leucochrysa (Leucochrysa) boxi Navás, 1930

DIAGNOSIS. — The characteristic of a medial dark stripe on the meso- and metanota is shared by *L. (L.) longicornis* and *L. (L.) boxi*. In characters of the male genitalia they are also similar, including the subapical constriction of sternite 8 + 9. However, the two species differ in that *L. (L.) longicornis* has a tapering dark medial stripe on the pronotum, while *L. (L.) boxi* is pale medially and has two short, dark, lateral marks on the pronotum. The inner gradate series of the forewing of *L. (L.) boxi* is also distinctive, extending quite far basally and parallels the pseudomedius for a long distance.

HEAD. — Yellow; frons, clypeus, vertex and gena pale; scape and pedicel dark laterally and dorso-laterally; first 17 antennomeres (including pedicel) black on anterior surface; maxillary and labial palpi pale.

THORAX. — Pronotum dark at antero-lateral margin; meso- and metanota dark at mid-line (Fig. 41A). **Wings:** Venation mostly green; pterostigma dark; intramedian cell quadrangular; inner gradates curved medially to level of origin of fifth radial cross veins; dark oblique band at wing apex. Length (2.42 cm): width (0.84 cm) = ratio (2.88). Hindwing costal crossveins black, remainder of wing green (Fig. 41B). Length (2.21 cm): width (0.71 cm) = ratio (3.11).

ABDOMEN. — Dorsal surface and tergites dark-tinged (Fig. 41C). **Male genitalia:** Gonarcus lateral arms broad; gonarcus hardly curved and thick; gonocornua short, upturned with broad base; arcessus short with lateral lobes, medial lobe of arcessus decurved; gonosaccus without gonosetae (Fig. 41E, G). Dorsal apodeme of ectoproct forked posteriorly (near callus cerci)(Fig. 7D); sternites with many microtholi; sternites 8 + 9 narrow at apex, bearing setae (Fig. 41F).

MATERIAL EXAMINED. — **BRAZIL:** Santa Catarina: São Joaquim, 20 August 99, Borges, R. (1 ♂)(apple).

Leucochrysa (Leucochrysa) pretiosa (Banks, 1910)

DIAGNOSIS. — This species forms part of the *varia* species group having extensive red suffusion of the frons and vertex, completely pale pronotum, and heavy, dark, poorly delimited markings of the meso- and metanota. It is one of three species having no dark spot at the base of the intramedian cell. Amongst these three species male genital characters are the most reliable. *Leucochrysa bruneola* has lateral arms of the gonarcus angled at about 45° and closely spaced gonocornua which are short and

parallel. *Leucochrysa walkeriana* has vertically oriented lateral arms of the gonarcus, but the short, parallel gonocornua are widely separated. *Leucochrysa pretiosa* has lateral arms of the gonarcus vertically oriented, and more massive, closely-spaced gonocornua which appear to diverge at their inner margins.

HEAD. — Yellow, but broadly red-tinged; vertex wine red, raised medial area pale, between antennal sockets brown-tinged; frons, clypeus and labrum wine red with some clear areas; gena red; maxillary and labial palpi pale; scape and pedicel red; flagellum pale (Fig. 42A).

THORAX. — Cervical sclerites red; pale pronotum yellow unmarked; most of mesonotum brown; metanotum brown except scutellum and borders of scutum (Fig. 42E); pterostigma faintly black marked. **Wings:** Forewing black-tinged basally; longitudinal veins (costa, Rs, pseudomedia, pseudocubitus, and anals) black at base; inner and outer gradates black; four apical Psm-Psc crossveins black and outer gradates with brown shading; basal Rs crossveins black at intersections. Hindwing venation mostly pale; costal crossveins black. Forewing length (2.03 cm): width (0.72 cm) = ratio (2.82). Hindwing length (1.81 cm): width (0.60 cm) = ratio (3.02) (Fig. 42B).

ABDOMEN. — Green, dorso-medial line pale yellow, tergites 5, 6 marked with brown (Fig. 42J); **Male:** Ventral fork of dorsal apodeme of ectoproct long, with acute apex (Fig. 42C). Gonarcus slightly arched, lateral arms large, vertically oriented (Fig. 42G); gonocornua slender, decurved; arcessus medial point decurved with thin lateral lobes, not seen in dorsal view; few gonosetae on gonosaccus (Fig. 42D, G). **Female:** genitalia with convoluted spermatheca, vela large, gland short; two long filamentous bursal glands present (Fig. 42F); subgenitale divided into two parts (Fig. 42H, I); two sclerotized plates close to base of subgenitale with cerci and two irregular sclerotized structures can be seen (Fig. 3H, I).

MATERIAL EXAMINED. — **Venezuela:** San Esteban, 1 January, Anduze, syntype male (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: Mato Grosso:** Itiquira, 23 January 97, Freitas, S. (3♂2♀)(rubber); 5 April 97, Freitas, S. (1♂)(rubber); 4 November 96, Scomparin, C. H. J. (1♂)(rubber).

Leucochrysa (Leucochrysa) varia (Schneider, 1851)

DIAGNOSIS. — *Leucochrysa varia* forms part of a species complex with character states mentioned above for other species. The dark spot at the base of the intramedian cell help distinguish this species from all others in the complex, except *L. ampla*. The most distinctive characteristics separating these two species are the multiply-coiled spermatheca and short, uncoiled spermathecal duct of *L. varia*.

HEAD. — Yellow with red markings. Vertex, frons, clypeus, genae, labrum, scape and pedicel marked pale red. Maxillary and labial palpi unmarked (Fig. 43B, D).

THORAX. — Cervical sclerite red; pronotum yellow unmarked; meso- and metanotum brown-tinged (Fig. 43B). **Wings:** Pterostigma faintly black marked; marginal endings of costal crossveins black; apex of Rs dark; inner gradates pale, outer gradates black and shaded, first and second ones more evident; third and apical psm-pscu crossveins black and shaded (Fig. 43A); length (2.08–2.13 cm); width (0.72–0.83). Hindwing middle costal crossveins, black; apex of Rs faintly dark; length (1.83–1.86 cm); width (0.54–0.56 cm) (Fig. 43A).

ABDOMEN. — Yellowish, 5th and 6th tergites marked with brown (Fig. 43C). **Male:** Dorsal apodeme of ectoproct well-sclerotized and prolonged posteriorly into an acute apex; few microtholi present; callus cerci with few trichobothria, whose setae are strong and short (Fig. 43E); Male genitalia with stout gonarcus and vertically elongate lateral arms; gonocornua short, not extended to apex of arcessus; arcessus a heavily sclerotized sac from which apex of gonocornua extends; apical lobes laterally rounded, medial hook decurved, heavily sclerotized; gonosaccus with a few gonosetae (Fig.

43G, H). **Female:** Genitalia with spermatheca long and convoluted; gland short; bursa sac-like (Fig. 43E); subgenitale bilobed, with short ventral projection (Fig. 43F).

MATERIAL EXAMINED. — **Brazil:** unknown locality, holotype male (deposited in Museum of Comparative Zoology, Harvard University), **São Paulo:** Jaboticabal, April 1993, Murtati, G. (1♂); Luiz Antonio, 29 April 1994, Freitas, S. (1♀)(eucalyptus). **Mato Grosso:** Itiquira, 23 January 1997, Freitas, S. (1♂)(rubber).

Leucochrysa (Leucochrysa) walkeriana Navás, 1913

DIAGNOSIS. — This species is a member of the *varia* species complex. The lack of a dark spot at the base of the intramedian cell groups it with two other species: *L. bruneola* and *L. pretiosa*. The most distinguishing feature of *L. walkeriana* is the widely spaced gonocornua of the male genitalia. It also has smaller gonocornua than *L. pretiosa* and more vertically aligned lateral arms of the gonarcus than *L. bruneolus*.

HEAD. — Yellow, marked with red. Raised medial area of vertex with anterior converging stripes extended to antennal bases; lateral area red-tinged. Scape and pedicel red-tinged; flagellum pale, first five antennomeres with small black spot along anterior surface. Gena red. Frons with pair of small red spots below antennae. Clypeus red-tinged medially (Fig. 44C).

THORAX. — Pronotum bright green, without marks. Meso- and metanota dark; mesonotum with brown marks along anterior prescutum and lateral scutum (Fig. 44B). **Wings:** Venation pale, except basal area, marginal junctions of costal crossveins, first radial crossvein, gradates, apical Psm-Pscu crossveins dark. forewing length (2.15 cm): width (0.85 cm) = ratio (2.52). Hindwing costal crossveins and middle part of Rs dark (Fig. 44A). Length (1.88 cm): width (0.67 cm) = ratio (2.81). Pterostigma of fore- and hindwing with dark mark basally.

ABDOMEN. — Green, unmarked. **Male:** Gonarcus lateral arms slightly higher than long. Gonocornua short, slightly decurved. Entoprocessus sharply decurved at base of gonarcus. Arcessus broad with lateral lobes; medial hook apically decurved. Gonosaccus without gonosetae (Fig. 44D, E).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Campinas, 22 July 1991, Chinchilla, C. (1♂)(orange).

Leucochrysa (Leucochrysa) bruneola de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, 10-V-96, Seringueira, PEM 811, Scomparin, C. H. J." (rubber).

DIAGNOSIS. — This is a member of a group of species having extensive red suffusion of the head, completely pale pronotum, and extensive dark markings on the mesonotum. The lack of a dark spot at the base of the intramedian cell is characteristic of this and two other species: *L. pretiosa* and *L. walkeriana*. The most distinctive feature of *L. bruneola* is the lateral arms of the gonarcus oriented at a 45° angle to vertical, as opposed to the more usual 90° angle in other species (Fig. 45C, E). Additionally, the gonocornua are more widely spaced in *L. walkeriana*, and gonocornua are larger and more divergent along the inner margins in *L. pretiosa* (Fig. 42D).

The name "bruneola" comes from the Medieval Latin *brunneus* for brown and Greek *olos* for mud or dirt and refers to the brown meso- and metanota.

HEAD. — Pale green. Gena red. Frons and clypeus lightly red-tinged. Vertex with red A-shaped mark with legs expanded near eye margins; pair of small red spots along posterior margin near eye (Fig. 45B). Scape and pedicel completely suffused with red; antennal fossa red.

THORAX. — Cervical sclerites red. Pronotum pale, unmarked. Meso- and metanota pale with dark brown tinge; mesoprescutum and scutum with amorphous dark spots; second axillary sclerite

dark (Fig. 45B). **Wings:** Forewing venation pale, costal crossvein apices, first four R-Rs crossveins, gradates, and apical Psm-Psc crossveins dark. Length (2.1 cm): width (0.82 cm) = ratio (2.56). Hindwing venation pale, except costal crossveins dark (Fig. 45A). Length (1.81 cm): width (0.63 cm) = ratio (2.87). Pterostigma of both fore- and hindwing with dark basal spot.

ABDOMEN. — Yellow, unmarked. **Male:** Gonarcus thick, wide and short. Gonocornua conical, apically decurved. Arcessus with heavily-sclerotized median, decurved, apical hook; lateral lobes not projecting posteriorly. Gonosaccus with few large gonosetae (Fig. 45C, D, E).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Leucochrysa) catarinae de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Catarina, SC, Fraiburgo, 26-09-99, Borges, R.” (apple).

DIAGNOSIS. — This species is unique amongst *Leucochrysa* (*Leucochrysa*) species in several ways. There are virtually no dark markings anywhere on the body. Amongst species found in Brazilian agro-ecosystems only *L. boxi* has no dark markings on the abdomen, and yet it has dark longitudinal stripes on the meso- and metanota. The female genitalia are also unique. The spermathecal duct is long, yet only moderately coiled at its apex. The vela of the spermatheca is long and flattened in its apical half, unlike the tubular structure of most other species. These genitalic structures are so distinctive that we are departing from the usual procedure in describing the species based only on a female specimen.

The name “catarinae” refers to the state of Santa Catarina, which in English is Saint Catherine.

HEAD. — Yellow, without markings. Labial and maxillary palpi pale. Scape, pedicel and flagellum pale.

THORAX. — Pro-, meso-, and metanota pale, without markings. **Wing:** Venation pale, except first eleven costal crossveins, first three radial crossveins, middle part of Rs and last six crossveins, gradates and marginal forks dark. Forewing length (1.81 cm): width (0.56 cm) = ratio (3.1) (Fig. 46A). Hindwing length (1.73 cm): width (0.55 cm) = ratio (3.15). Pterostigma with slightly dark pigmentation at basal margin.

ABDOMEN. — Green, unmarked. **Female:** Spermatheca apically slender, with basal half flattened, coiled. Spermathecal duct long, apically coiled. Subgenitale wide with small anterio-medial projection (Fig. 46B).

MATERIAL EXAMINED. — Known only from the holotype.

Genus *Leucochrysa* (*Nodita*) Navás, 1916

The subgenus *Leucochrysa* (*Nodita*) can be defined by the forewing triangular or ovate intramedian cell, sinuous radial sector, and short basal extension of the female subgenitale (Brooks and Barnard 1990). The male genitalia are inseparable from the nominate subgenus and the two groups remain close. Species of *Leucochrysa* (*Nodita*) are generally smaller than *Leucochrysa* (*Leucochrysa*) with forewing length ranging from 9 mm to about 30 mm, although a few of the larger species, such as *L. (Nodita) amazonica* rival species of *Leucochrysa* (*Leucochrysa*) in size. This is the most speciose group of chrysopids in the New World, with Brooks and Barnard (1990) listing 120 species and several more having been subsequently described (Penny 1998, 2001). Herein we describe 24 more, previously undescribed, taxa. This subgenus will probably eventually contain more than 200 species. They are distributed from the southern U.S.A. (Penny et. al 1997) to northern Argentina (Penny 1978). We have found 36 species in Brazilian agro-ecosystems, adults of which can be distinguished using the following key.

KEY TO SPECIES OF *LEUCOCHRYSA* (*NODITA*) FOUND IN BRAZILIAN AGRO-ECOSYSTEMS

1. Scape with one longitudinal stripe (Fig. 81A) 2
- 1'. Scape with two stripes (Fig. 53A), completely dark (Fig. 49A), or of other form (Fig. 51A) 20
2. Scape with dorsal longitudinal stripe (Fig. 81A) *L. (N.) vittata*
- 2'. Scape with lateral longitudinal stripe (Fig. 47A) 3
3. Lateral stripe of scape well defined and wide, attaining both the anterior and posterior sides of the scape (Fig. 47A) 4
- 3'. Lateral stripe of scape narrow, not attaining the anterior and posterior sides of the scape (Fig. 62A) 14
4. Flagellum pale (Fig. 77C) 5
- 4'. Flagellum completely (Fig. 55A) or partially dark (Fig. 47A) 7
5. Forewing with base of Rs, MA and inner gradate veins dark and darkly margined (Fig. 61B) *L. (N.) confusa*
- 5'. Forewing with base of Rs, MA and inner gradate veins dark, but without margining or shading (Fig. 47B) 6
6. Central arch of gonarcus elongate and thin, gonocornua small (Fig. 79D, E) *L. (N.) tenuis*
- 6'. Central arch of gonarcus short and thick; gonocornua long (Fig. 60E, F) *L. (N.) barrei*
7. Forewing with dark spots on crossveins (Fig. 70B); dark spot on the dorsal surface of the basal antennal cavity; first two flagellar segments dark; pronotal stripes not reaching anterior margin (Fig. 70A) *L. (N.) maculosa*
- 7'. Forewing without dark spots on crossveins (Fig. 47B); basal antennal cavity without dorsal mark; flagellum totally dark or dark on one side; pronotal stripes reaching anterior margin (Fig. 57A) 8
8. Flagellum with only one side darkened (Fig. 47A) 9
- 8'. Flagellum completely dark (Fig. 52A) 10
9. Forewing with medial part of Rs and contiguous crossveins dark; marginal forks dark; hind margin of hindwing darkened (Fig. 47B) *L. (N.) camposi*
- 9'. Forewing with Rs completely pale; marginal forks pale; hind margin of hindwing pale (Fig. 68B) *L. (N.) interata*
10. One or two circular dark spots on mesonotum (Fig. 66A) 11
- 10'. No circular dark spots on mesonotum (Fig. 52A) 12
11. A single pair of dark spots on mesonotum (Fig. 66A); no dark spots on 2nd axillary sclerite; small dark spot on lateral surface of scape (Fig. 66D) *L. (N.) ictericus*
- 11'. Two pair of dark spots on mesonotum; a dark spot at base of 2nd axillary sclerite (Fig. 57A); lateral surface of scape completely pale (Fig. 56D) *L. (N.) melanocera*
12. Lateral stripe of pronotum well defined, straight, wide, reaching the anterior and posterior margins (Fig. 58A) *L. (N.) rodriguezi*
- 12'. Lateral stripe of pronotum undulating and not reaching posterior margin; inner and outer margins of flagellum equally darkened (Fig. 55 A) 13
13. Gena pale yellow; posterior margin of hindwing pale (Fig. 52B); spermatheca short, broad, with a small lateral projection opposite juncture with spermathecal duct (Fig. 52D) *L. (N.) intermedia*
- 13'. Gena red (Fig. 55C); posterior margin of hindwing darkened (Fig. 55B); spermatheca elongate and coiled (Fig. 55I) *L. (N.) marginalis*
14. Gena with dark markings (Fig. 49C) 15
- 14'. Gena completely pale (Fig. 64F) 19
15. Pronotal stripe broken into small spot at anterior margin and larger spot at mid-length (Fig. 62A); arcessus bearing pair of dorsal horns (Fig. 62F) 16
- 15'. Pronotal stripe continuous, even if constricted at mid-length (Fig. 72A); arcessus not bearing pair of dorsal horns (Fig. 72F) 17
16. Maxillary palps pale (Fig. 62C); dark spot on mesoscutum barely visible (Fig. 62A); dorsal horns of arcessus projecting posteriorly (Fig. 62D) *L. (N.) cornuta*
- 16'. Maxillary palps dark apically (Fig. 48C); dark spot on mesoscutum well developed (Fig. 48C); dorsal horns of arcessus projecting dorsally (Fig. 48E) *L. (N.) clepsydra*
17. Mesonotum bearing pair of well-developed dark spots (Fig. 72A) *L. (N.) parallela*
- 17'. Mesonotum completely pale (Fig. 73A) 18

18. Maxillary palps dark; gena completely red (Fig. 75D) *L. (N.) santini*
 18'. Maxillary palps pale; gena red only near frons (Fig. 74D) *L. (N.) robusta*
 19. Gonarcus narrow, gonocornua in the form of a broad plate with small apical point (Fig. 73C) *L. (N.) retusa*
 19'. Gonarcus broad; gonocornua narrower, with more elongate point (Fig. 80E) *L. (N.) vignisi*
 20. Scape with two dark stripes (Fig. 53A) 21
 20'. Dorsal surface of scape completely dark (Fig. 49A) 24
 21. Pronotum with two pair of stripes (Fig. 53A) 22
 21'. Pronotum with a single pair of lateral stripes (Fig. 49A) 23
 22. Forewing with Rs and adjacent veins dark (Fig. 53B); a single pair of dark marks on abdominal tergites (Fig. 53G) *L. (N.) lancala*
 22'. Forewing with most veins pale, including Rs and adjacent veins (Fig. 56B); abdomen with five pairs of dark marks on tergites (Fig. 56E) *L. (N.) marquezii*
 23. Hindwing apically pale (Fig. 76B); vertex with lateral dark stripes and two central crescent-shaped marks (Fig. 76A); pronotum marks confined to two pair of small spots (Fig. 76A) *L. (N.) scomparini*
 23'. Hindwing apically dark (Fig. 51B); vertex pale, except for continuation of scape stripe; pronotum with complete dark lateral stripe (Fig. 51A) *L. (N.) herioles*
 24. Gonocornua elongate, in the form of spines (Fig. 67D) 25
 24'. Gonocornua forming shorter flat plates (Fig. 65E) 29
 25. Forewing pterostigma weakly darkened (Fig. 67A); gonocornua twisted (Fig. 67D) *L. (N.) incognita*
 25'. Forewing pterostigma with well-developed dark mark (Fig. 49B); gonocornua slender, straight (Fig. 50F) 26
 26. Base of Rs in the forewing darkened (Fig. 49B) 27
 26'. Base of Rs in the forewing pale (Fig. 54B) 28
 27. Flagellum dark (Fig. 52A); gonarcus strongly arched anteriorly; gonocornua forcipate; dorsal horns of arcessus apically pointed (Fig. 49F) *L. (N.) cruentata*
 27'. Flagellum pale (Fig. 68A); gonarcus only weakly arched anteriorly; gonocornua straight; dorsal horns of arcessus apically rounded (Fig. 50 E, F) *L. (N.) gossei*
 28. Vertex with Y-shaped dark mark behind antennal bases (Fig. 54A); a2-a3 crossvein not darkly margined; base of forewing darkened (Fig. 54B) *L. (N.) lateralis*
 28'. Vertex bearing dark lateral stripes beside eyes and two medial crescent-shaped marks (Fig. 77A); a2-a3 crossvein darkly margined, but base of forewing pale (Fig. 77B) *L. (N.) squamisetosa*
 29. Medial margin of pronotal stripes not straight, not well defined (Fig. 65A); abdomen bearing series of crescent-shaped dark marks (Fig. 65C) 30
 29'. Medial margin of pronotal stripes straight, well-defined (Fig. 69A); abdomen bearing longitudinal dark medial stripe (Fig. 64C) 31
 30. Gonocornua apically directed, widest at base (Fig. 65F) *L. (N.) guataparensis*
 30'. Gonocornua apico-laterally directed, widest at mid-length (Fig. 59E) *L. (N.) affinis*
 31. Gonocornua much shorter than apex of arcessus (Fig. 64G) *L. (N.) furcata*
 31'. Gonocornua elongate, reaching to apex of arcessus (Fig. 69E) 32
 32. Gonarcus narrow (Fig. 69E); pterostigma only weakly darkened (Fig. 69B) 33
 32'. Gonarcus broad (Fig. 63E); pterostigma heavily pigmented (Fig. 63B) 34
 33. Rs of forewing and adjacent veins dark; basal cavity of antennae without dorsal dark mark (Fig. 69C); apical intersection of costal crossveins darkened; apex of gonocornua with a single point (Fig. 69E) *L. (N.) lineata*
 33'. Rs of forewing pale; basal cavity of antennae with dorsal dark mark (Fig. 78C); apical intersection of costal crossveins pale; apex of gonocornua forked (Fig. 78E) *L. (N.) tabacinus*
 34. Complete, dark transverse band directly behind antennal base (Fig. 63D); apex of gonocornua bifurcate (Fig. 63E) *L. (N.) forciformis*
 34'. No transverse band on vertex behind antennal bases (Fig. 71D); apex of gonocornua with a single point (Fig. 71E) *L. (N.) michelini*

Leucochrysa (Nodita) camposi Navás, 1933

DIAGNOSIS. — This species is one of several that have a dorso-lateral stripe on the scape, paired marks on the raised medial portion of the vertex, submedial dark markings on meso- and metanota, middle region of the Rs darkened, pale apex to the hindwing, and paired dark markings on each abdominal segment. *Leucochrysa (Nodita) melanocera* can be separated by its pale gena, completely dark flagellum, and pale metanotum. *Leucochrysa (N.) cruentata* has dark palpi and dark scape marking covering entire dorsal surface. *Leucochrysa (N.) scomparini* has a medial dark spot on the scape, longitudinal lateral stripes on the vertex, and metascutellum completely dark. *Leucochrysa (N.) vittata* has no dark lateral stripe on the pronotum, scape stripe is medial rather than lateral, and no dark markings on metascutellum. *Leucochrysa (N.) affinis*, *L. (N.) guataparensis*, and *L. (N.) rodriguezi* have dark antennae and much reduced dark markings on meso- and metanota. *Leucochrysa (N.) furcata*, *L. (N.) lineata*, *L. (N.) michelini*, and *L. (N.) tabacinus* form a group of species which have pale gena, broader and more extended lateral pronotal stripes, and dark abdominal markings completely covering tergites. However, the most distinctive feature of *L. (N.) camposi* is the subapical, truncate plate of the arcessus. This feature is found in no other species encountered in agro-ecosystems, but is found in the more northern *L. (N.) amazonica*. Both species have other characteristics in common, such as large size (forewing length > 20 mm), crescent-shaped markings on the vertex, and dark Rs vein at mid-length. However, *L. (N.) amazonica* bears no scape stripe, nor does it have dark metanotal and abdominal tergal markings.

HEAD. — Yellow. Frons without marks. Gena with thin red stripe. Maxillary and labial palpi pale (Fig. 47A, C). Vertex yellow, raised, marked with two medial, crescent-shaped red bands. Antennal scape and pedicel with dark red, dorso-lateral stripe continued onto antennal fossa; flagellum basally dark on lateral margin, apically pale.

THORAX. — Green with yellow dorsal median stripe. Pronotum with antero-lateral darkened band (Fig. 47A). Mesonotum marked with red spots on prescutum and scutum. Metanotum with red spots on scutum and scutellum (Fig. 47G). **Wings:** Venation green, except marginal endings of costal crossveins, middle part of Rs, Psm-Psc crossveins 1–7, forks of marginal veins and anal veins dark. Pterostigma slightly darkened basally. Length (2.08–2.15 cm); width (0.64–0.76 cm) (Fig. 47B). Hindwing pterostigma well marked. Hindwing green, except last radial crossvein, last costal crossvein, middle part of Rs, and posterior marginal area darkened (Fig. 47B). Length (1.78 cm); width (0.59 cm) = ratio (3.02).

ABDOMEN. — Green, with red marks on all tergites (Fig. 47I). **Male:** Sternite 8 + 9 not completely fused; microtholi present (Fig. 47H). Gonarcus thick with triangular lateral arms. Gonocornua long and apically decurved. Entoprocessus absent. Arcessus with subapical dorsal plate and apical ventrally-folded plate with medial point (Fig. 47D, E, F). **Female:** Subgenitale with short, antero-medial projection (Fig. 47J). Bursa sac-like, folded at apex, with pair of filamentous, multiply-forked accessory glands. Spermatheca long, ventral impression short.

MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 18 July 1998, Freitas, S. (1♂)(rubber)(CAS); **São Paulo:** Taquaritinga, 8 June 1993, Xavier, A. L. Q. (1♂)(orange); 21 October 1992, Freitas, S. (1♀)(orange); Catanduva, May 1994, Silva, J. L. (1♂)(orange); Taquaral, 13 March 1991, Freitas, S. (1♂)(orange); 5 March 1991, Freitas, S. (1♀)(orange); Jaquariuna, May 1992, Kubo, R. K. (5♂)(orange); Jaboticabal, 26 August 1995, Freitas, S. (1♂)(guava); Taiuva, 27 May 1992, Pessoa, R. (1♂)(orange); 8 June 1990, Freitas, S. (1♀)(orange); 11 September 1995, Ferreira, R. J. (2♀)(guava); 21 October 1995, Ferreira, R. J. (1♀)(guava); October 1989, Fernandes, O. D. (1♀); 10 July 1998, Freitas, S. (1♀)(CAS).

Leucochrysa (Nodita) clepsydra Banks, 1918

DIAGNOSIS. — *Leucochrysa (N.) clepsydra* is associated with *L. (N.) cornuta* by the thin, red stripe of the gena; pale antennae with thin, incomplete dorsal stripe of the scape; pair of dark lateral spots on either side of pronotum of unequal size; pair of dark mesonotal spots; forewing Rs with dark area at mid-length, and pale apex of hindwing. Differences between the two species include dark maxillary palpi; two small dark spots on vertex; small gonarcus with vertically elongate lateral arms and longer pair of subapical dorsal horns in *L. (N.) clepsydra*.

HEAD. — Yellowish green. Gena with reddish stripe near frons. Apical maxillary palpimeres dark. Vertex marked with two, diverging, elongate, red spots (Fig. 48A,C). Antennae pale with short red stripe dorso-laterally on scape.

THORAX. — Cervical sclerites red. Pronotum with two red spots laterally on either side. Mesonotum with pair of red spots (Fig. 48A). Metanotum unmarked. **Wings:** Forewing venation green, except both junctures of costal crossveins, apex of Rs, gradates and marginal forks dark (Fig. 48B). Pterostigma weakly darkened basally. Forewing length (1.46 cm): width (0.50 cm) = ratio (2.92).

ABDOMEN. — Green, marked with red. **Male:** Gonarcus short, poorly defined, with small, ovate lateral arms. Gonocornua well developed, apically decurved, surface with tiny setae. Arcessus poorly sclerotized, with pair of large, dorsal, subapical horns between gonocornua and apico-medial point and two, small, rounded, lateral lobes. Gonossacus with few, scattered, lateral gonosetae (Fig. 48D, E, F).

MATERIAL EXAMINED. — **Colombia:** Caldas, May, 4900 ft. [1490 m], Fassl, four syntypes (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: São Paulo:** Taquaritinga, 8 January 1993, Xavier, A. L. Q. (1♂)(orange).

Leucochrysa (Nodita) cruentata (Schneider, 1851)

DIAGNOSIS. — This species is part of the complex having red gena, crescent-shaped marks on the vertex, dark submedial markings on meso- and metanotum, and extensive dark markings on abdominal tergites. However, the combination of dark palpi, completely red dorsal surface of the scape, shading of the origin of Rs on the forewing, and large, incurved gonocornua will separate this from all other species.

HEAD. — Green. Gena red. Frons unmarked. Clypeus laterally marked with red (Fig. 49C). Maxillary and labial palpimeres dark. Vertex with divergent red stripes on medial raised area. Scape completely red dorsally, the red coloration extends onto basal membrane, pale ventrally; pedicel with red ring not shown on illustration; flagellum pale (Fig. 49A).

THORAX. — Green, marked with red. Pronotum as wide as long, with lateral red stripes, broader at mid-length and converging anteriorly. Meso- and metanotum with variegated red marks (Fig. 49A). **Wings:** Forewing venation pale, except costal crossveins, R-Rs crossveins, Rs-Psm, inner and outer gradates, marginal forks, and Rs dark. Origin of Rs with brown shading. Wing base with linear red mark (Fig. 49B). Pterostigma with basal dark spot. Length (2.50 cm): width (0.98 cm) = ratio (2.55). Hindwing venation pale, except costal crossveins, and inner and outer gradates dark (Fig. 49B). Pterostigma with heavy dark mark basally. Length (2.13 cm): width (0.73 cm) = ratio (2.92).

ABDOMEN. — Tergites 3, 5, 6, 7, and 8 with reddish brown crescent-shaped marks (Fig. 49D). **Male:** Microtholi absent. Lateral arms of gonarcus ovate. Gonocornua large, widely separated basally, apically incurved at a sharp angle. Arcessus broad; dorsal surface poorly sclerotized, with pair of subapical, dorsal horns, apical portion decurved, with medial hook and membranous, rounded lateral lobes (Fig. 49E, F, G, H). **Female:** Subgenitale with apical sclerotized sac with many gonocristae

(Fig. 49J). Spermatheca large, thick. Vela and bursal duct well developed. Spermathecal duct thin, with apical brush (Fig. 49I).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 21 December 1993, Freitas, S. (1♂)(rubber); 17 August 1995, Freitas, S. (2♂1♀)(orange); 11 October 1995, Freitas, S. (1♂)(rubber); 10 February 1998, Freitas, S. (1♂)(guava); 5 July 1998, Freitas, S. (1♀)(CAS); 5 August 1998, Freitas, S. (1♀)(guava); 10 March 1999, Freitas, S. (1♀)(CAS).

Leucochrysa (Nodita) gossei (Kimmins, 1940)

DIAGNOSIS. — This species appears to be closely related to *L. (N.) cruentata* because of the completely red dorsum of the scape, red gena, dark lateral markings of both meso- and metanota, dark shading of the origin of Rs on the forewing. However, *L. (N.) gossei* has pale palpi and the tergal marks on the abdomen are quite different. In the male genitalia, the gonocornua of *L. (N.) gossei* are slightly turned outward, while in *L. (N.) cruentata* they are strongly medially curved.

HEAD. — Yellow. Gena red. Apical maxillary palpimeres dark. Vertex with pair of small, thin red marks. Scape completely red dorsally, pale ventrally; pedicel pale; flagellum pale (Fig. 50A, C).

THORAX. — Green. Pronotum longer than wide, with lateral stripes dark red. Meso- and metanotum yellow with brown spots (Fig. 50A). **Wings:** Forewing venation green, except gradates, R-Rs crossveins, apices of Rs-inner gradates, marginal forked and unforked veins, and Psm-Psc crossveins dark. Gradates not darkly bordered. Pterostigma with dark basal mark. Length (1.47 cm): width (0.56 cm) = ratio (2.63). Hindwing with acute apex. Pterostigmal dark spot well defined. Venation green, except apex of Rs, gradates, and marginal forks dark (Fig. 50B). Length (1.27 cm): width (0.41 cm) = ratio (3.10).

ABDOMEN. — Yellow with large dark spot on tergite 3, two small ones on tergite 4, large one on tergite 6, and two small dark marks on tergite 7 (Fig. 50D). **Male:** Dorsal apodeme of ectoproct forked near callus cerci. Microtholi absent. Gonarcus arcuate; lateral arms short. Gonocornua elongate, parallel and apically decurved. Arcessus broad; with pair of dorsal plates elongate, upturned, apically truncate; apex with small medial horn and acute lateral lobes. Gonosaccus with few gonosetae (Fig. 50E, F, G). **Female:** Spermatheca twice-recurved. Bursa wrinkled with a pair of long accessory glands. Subgenital with short, rounded lateral lobes and elongate medial projection (Fig. 50H, I).

MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 14 September 98, Freitas, S. (1♂)(rubber); **São Paulo:** Luis Antonio, 9 August 1993, Freitas, S. (1♀)(CAS); 8 June 1994, Freitas, S. (1♂)(CAS).

REMARKS. — This species was originally described by Walker (1853) as *Chrysopa conformis*. However, Walker's name is an objective junior homonym of *Hemerobius conformis* Rambur, 1842, a name which was subsequently transferred to the genus *Chrysopa* by Walker himself in 1853.

Leucochrysa (Nodita) heriocles Banks, 1944

DIAGNOSIS. — *Leucochrysa (Nodita) heriocles* is distinctive in being the only species with a dark apex to the hindwing found in the agro-ecosystem. Several other species found further north have this trait. Of these species only *L. (N.) apicata*, *L. (N.) indiga*, and *L. (N.) postica* have dark palpi, apically expanded stripe on the scape, and lateral red pronotal stripe (see Penny 2001). However, *L. (N.) indiga* has a complete dark band across the frons and *L. (N.) postica* has an almost complete band. Neither of these species have dark markings on meso- and metanotum. *Leucochrysa (N.) apicata* and *L. (N.) heriocles* are close, and may in fact be the same species, both having elongate gonocornua which approximate or cross apically, but *L. (N.) heriocles* males have a distinctive scalloping and apical point to sternite 9, which is not nearly so accentuated in *L. (N.) apicata*.

HEAD. — Yellow. Narrow red band across clypeus under and between anterior tentorial pits. Gena red. Apical labial and maxillary palpi dark. Vertex pale, unmarked. Scape with red stripe dorso-laterally expanded to complete ring apically, basally extended onto basal membrane; pedicel with apical dark ring; flagellum pale, except for dark stripe along medial margin of antennomeres 1–3 (Fig. 51A, C).

THORAX. — Yellowish green. Pronotum longer than wide with lateral dark red stripe. Mesonotum with diffuse reddish marks, especially pronounced along anterior margin. Metanotum pale, unmarked (Fig. 51A). **Wings:** Forewing longitudinal and some associated crossveins dark. Dark pterostigmal spot quite evident. Gradates, Psm–Psc crossveins; and forked marginal veins bordered (Fig. 51B). Length (1.18 cm): width (0.42 cm) = ratio (2.81). Hindwing acute; apex with diffuse dark spot. Dark pterostigmal spot well defined. Rs, costal crossveins black; outer gradates, and forked marginal veins dark. Outer gradates darkly margined (Fig. 51B). Length (0.97 cm): width (0.30 cm) = ratio (3.23).

ABDOMEN. — Green with two small dark spots on tergite 1 and other larger ones covering tergites 3 and 6 (Fig. 51H). **Male:** Sternites 2–8 with dense microtholi. Erect setae on apical sternite stouter than on tergites and arising from pit in cuticle. Apex of sternite 9 scalloped laterally, forming medial point lined dorsally by band of gonocristae (Fig. 51 I, J). Gonarcus arcuate, with short, ovate lateral arms. Gonocornua elongate, medially angled, apically approximated. Arcessus broad basally, with pair of small, dorsal, subapical horns and small apico-medial hook flanked by two small rounded lobes. Gonosaccus with sparse gonosetae. **Female:** Spermatheca elongate, distally coiled (Fig. 51G).

MATERIAL EXAMINED. — **Surinam:** Paramaribo, Charlesburg, 5 May 1941, Geijskes, syntype male (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: Mato Grosso,** Itiquira, 23 March 97 (1♂)(rubber); 18 February 1996, Scomparin, C. H. J. (1♂)(rubber); 10 November 97, Scomparin, C. H. J. (3♂4♀)(rubber).

Leucochrysa (Nodita) intermedia (Schneider, 1851)

DIAGNOSIS. — The combination of dark antennae, lack of dark markings on meso- and metanotum, and dark markings only on tergites 1 and 2 will separate this species from all others. The lateral projection of the spermatheca vela and tiny pits on the accessory glands are also distinctive for *L. (Nodita) intermedia*. The closest species is probably *L. (N.) marginalis*, from which *L. (N.) intermedia* can be separated by its larger size (forewing length 19 mm) and pale posterior margin of the hindwing.

HEAD. — Yellow, somewhat red-tinged on clypeus, frons and vertex. Vertex with V-shaped medial dark mark. Scape with red stripe dorso-laterally; pedicel dark-ringed subapically; flagellum dark (Fig. 52A).

THORAX. — Pronotum yellowish green with pale red stripe laterally. Meso- and metanotum pale, unmarked. **Wing:** Fore- and hindwing pterostigma heavily pigmented basally. Venation pale, except origin of Rs, costal crossveins, middle part of Rs and contiguous veins, inner gradates, pseudocubital crossveins and branches of forked marginal veins dark. Length (1.89 cm): width (0.70 cm) = ratio (2.70). Hindwing venation pale, except middle costal crossveins, Rs-inner gradate crossveins and contiguous veins dark (Fig. 52B). Length (1.71 cm): width (0.54 cm) = ratio (3.17).

ABDOMEN. — Green. Tergites 1 and 2 with dark red markings (Fig. 52C). **Female:** Bursa copulatrix sac-like with pair of filamentous accessory glands bearing tiny, circular, sclerotized pits on the surface (Fig. 52D). Subgenitale two short lateral lobes and large antero-medial projection (Fig. 52E). Spermatheca short, thick; vela with small lateral projection (Fig. 52D).

MATERIAL EXAMINED. — **Brazil: Santa Catarina:** São Joaquim, March 1999, Borges, R. (1♀)(apple).

Leucochrysa (Nodita) lancala Banks, 1944

DIAGNOSIS. — The most distinctive characteristic of this species is the bird's-head-shaped apical projection of the arcessus. This species appears to be most closely related to *L. (N.) guataporensis* which also has the distinctively shaped apex of the arcessus, but the dark palpi, unconnected red stripes on the scape, and thinner gonocornua sets *L. (N.) lancala* apart.

HEAD. — Pale yellow. Frons with small, reddish brown spot between and below antennae. Third and fourth maxillary palpimeres and basal half of fifth segment dark. Gena red. Vertex yellow with thin, red, medial, V-shaped mark; on raised medial area two faint, widely-spaced, red, crescent-shaped marks. Scape pale with dorsolateral red stripe, continued onto antennal base and short dorso-medial red spot; pedicel pale with dark subapical ring; flagellum pale with dark medial stripe basally (Fig. 53A, C).

THORAX. — Cervical sclerites red. Pronotum yellow medially; green submedially; red stripe on lateral margin, tapering posteriorly; postero-medial half with thin black stripe. Mesonotum pale with red tinge, more pronounced along anterior margin. Metanotum pale with red stripe laterally (Fig. 53A). **Wing:** Fore- and hindwing pterostigma dark. Venation green, except middle costal crossveins, origin of Rs, fourth Rs and contiguous veins, gradates, marginal forks and posterior ends of outer pseudocutibial veins 4–5 dark. Eight inner and nine outer gradate veins. Length (1.72–1.86 cm); width (0.55–0.67 cm). Hindwing apically acute. Venation pale, except middle of Rs and contiguous crossveins, gradates, and marginal forks dark. Length (1.55–1.74 cm); width (0.44–0.53 cm) (Fig. 53B).

ABDOMEN. — Green; mid-line yellow (Fig. 53G). **Male:** Apex of ectoproct truncated obliquely. Anterior half of sternite 8 + 9 with microtholi and posterior half with dense, short, black setae. Gonarcus thick, short, with ovate lateral arms. Gonocornua long, tapering, dorsally ridged, nearly straight, but with slight apical twist, and somewhat angled medially. Arcessus narrow, bilobed apodeme basally, strongly arched apically, with well-sclerotized apico-medial hook without lateral lobes (Fig. 53D, E, F). **Female:** Spermatheca thick, sinuous; ventral impression short. Bursa convoluted. Subgenital with swollen lateral lobes forming medial groove; antero-medial projection finely rugose (Fig. 53H, I, J).

MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 19 April 1993, Freitas, S. (1♂)(orange); 10 September 1999, Freitas, S. (1♀); 10 October 1995, Freitas, S. (1♂)(orange); March 1996, Freitas, S. (1♀)(guava)(CAS); 6 February 1997, Freitas, S. (1♀); March 1996, Freitas, S. (1♀); Birigui, 21 February 1996, Scomparin, C. H. J. (1♀)(corn); **Mato Grosso:** Itiquira, 18 September 1996, (3♀2♂)(rubber); 18 November 1996, Scomparin, C. H. J. (1♀)(CAS); 30 December 1996, Scomparin, C. H. J. (1♂)(rubber); 23 January 1997, Scomparin, C. H. J. (1♂)(rubber).

Leucochrysa (Nodita) lateralis Navás, 1913c

DIAGNOSIS. — This is one of several species with completely dark dorsal surface of the scape, V- or Y-shaped dark mark behind antennae on vertex, and dark markings on the meso- and metanotum. Of these species, *L. (N.) gossei* has dark maxillary palpi; *L. (N.) cruentata* has forewing shading at the origin of Rs; and *L. (N.) cruentata* and *L. (N.) affinis* have much larger lateral stripes on the pronotum. Perhaps the most closely related species is the more northern *L. (N.) virginiae*, which also has a pale pronotum, although with a small red spot in the antero-lateral corner (Penny 1998). However, *L. (N.) virginiae* has a complete, broad dark band across the frons, which is not present in *L. (N.) lateralis*. The most distinctive feature of this species is the lateral projection of the bursal vela.

HEAD. — Yellow with red markings. Gena red. Clypeus pale with slight red tinge. Maxillary and labial palpi pale. Frons pale with short red bands below antennal bases and small medial red mark be-

tween antennal bases. Anterior part of vertex with Y-shaped mark (Fig. 54C). Scape dark brown throughout; pedicel pale with subapical dark ring (Fig. 54A); flagellum pale.

THORAX. — Pronotum green with pair of small red spots on antero-lateral corners. Anterior margin of mesoprescutum and mesoscutum laterally reddish brown (Fig. 54A). **Wing:** Pterostigma with slight indication of dark mark basally. Forewing base and second axillary sclerite with brownish red spot. Venation pale, except ends of first eight costal crossveins, all of remaining costal crossveins; radial sector crossveins, gradates. Psm-Psc crossveins, and forked and unforked marginal veins dark (Fig. 54B). Forewing length (1.73 cm): width (0.59 cm) = ratio 2.93. Hindwing venation pale, except costal crossveins and gradates dark. Length (1.45 cm): width (0.44) = ratio 3.30.

ABDOMEN. — Green, with reddish brown marks on tergites 2, 3, 6, and 7 (Fig. 54A). **Female:** Spermatheca short, pill-box-shaped; vela with lateral projection. Spermathecal duct moderately long, twisted but not coiled, becoming wider near spermatheca. (Fig. 54D). Subgenitale broad, without medial projection (Fig. 54E).

MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 18 October 1996, Scomparin, C. H. J. (1 ♀)(rubber).

Leucochrysa (Nodita) marginalis Banks, 1915

DIAGNOSIS. — This is one of a group of species with pale palpi, red gena, dorso-lateral stripe on the scape, pair of crescent-shaped marks on the vertex, dark lateral stripes on the pronotum, and darkened area in the middle of the Rs of the forewing. However, only a few other species in the group have dark antennae: *L. (N.) intermedia*, *L. (N.) lineata*, *L. (N.) melanocera*, *L. (N.) michelini*, *L. (N.) rodriguezi*, and *L. (N.) tabacinus*. Of these species, all have abdominal markings and more extensive meso- and metanotal markings than *L. (N.) marginalis*. Males of none of the other species have the subapical truncate plate of the arcessus of *L. (N.) marginalis*.

HEAD. — Yellow. Frons with tiny red spot below and between antennae. Gena red. Maxillary and labial palpi pale. Vertex with pair of medial, short, red, crescent-shaped stripes. Scape with red dorso-lateral stripe; pedicel pale with subapical dark ring; first 17 segments of flagellum black and more apical segments fuscous (Fig. 55A, C).

THORAX. — Pronotum pale with lateral dark stripe, which is restricted at mid-length (Fig. 55A). Mescutum pale with pair of small red spots. Metanotum pale, unmarked. **Wings:** Forewing venation green, except marginal junctions of costal crossveins, origin of Rs, and middle part of Rs and contiguous crossveins dark. Gradates pale. Length (1.63 cm): width (0.59 cm) = ratio (2.76). Hindwing venation green, except endings of basal costal crossveins, middle part of Rs and contiguous veins, and branched endings of forked marginal veins dark. Shading along hind margin at forked marginal veins. Length (1.41 cm): width (0.45 cm) = ratio (3.13). Fore- and hindwing pterostigma dark basally (Fig. 55B).

ABDOMEN. — Tergites without dark markings. **Male:** Sternites 8 and 9 not fused. Microtholi present. Dorsal apodeme of ectoproct thick, well sclerotized near callus cerci (Fig. 55D). Gonarcus thick, arched; lateral arms well developed, triangular. Gonocornua elongate but not reaching apex of arcessus, thick at base. Arcessus large with subapical medial plate and small, depressed apico-medial hook (Fig. 55E, F, G). Gonosaccus with few gonosetae, continued as second sac-like structure above sternite 9. **Female:** Spermatheca short with short spermathecal duct; ventral impression short. Bursa sac-like with pair of filamentous accessory glands (Fig. 55I). Subgenitale rounded with small median projection (Fig. 55H).

MATERIAL EXAMINED. — **Bolivia:** Rio Longo, 750 m, Fassl, holotype male (deposited in Museum of Comparative Zoology, Harvard University), **Brazil: São Paulo:** Balsamo, 15-X-97, Bergman, E. (1 ♀ 1 ♂)(rubber).

Leucochrysa (Nodita) marquezii Navás, 1913a

DIAGNOSIS. — The oblique dark stripes at the posterior margin of the pronotum link *L. (N.) marquezii* with *L. (N.) affinis*, *L. (N.) guataporensis*, *L. (N.) internata*, and *L. (N.) lancala*. Of these species, *L. (N.) marquezii* is probably most closely related to *L. (N.) lancala*, with which it shares dark palpi and a dark mark on the medial surface of the scape. They also share sigmoidally curved gonocornua and quadrate lateral arms of the gonarcus of the male genitalia. However, *L. (N.) lancala* has more extensive dark markings on the meso- and metanotum, no dark markings on abdominal tergites 2 and 3, and a distinctively curved, bird's head shape to the apex of the arcessus (Fig. 53D).

HEAD. — Yellow. Frons with small reddish brown spot between and below antennae (Fig. 56C). Gena red (Fig. 56D). Apical maxillary palpimeres dark. Vertex pale with red, V-shaped mark behind antennal bases; posteriorly pair of crescent-shaped red stripes on raised medial area (Fig. 56A, C). Scape yellow with dorso-lateral red stripe continued onto antennal fossa, and short dorso-lateral red mark along medial margin (Fig. 56A); pedicel pale with subapical dark ring; flagellum pale.

THORAX. — Cervical sclerites red (Fig. 56C, D). Pronotum yellow medially, green submedially, with red stripe on lateral margin which tapers toward posterior margin; postero-medial region with pair of oblique, curved, black stripes about halfway between center line and margin. Mesonotum yellow with dark marks on prescutum and scutum (Fig. 56A). **Wings:** Forewing pterostigma with slightly dark pigmentation basally. Venation green, except first, second and last radial crossvein, apex of Rs, Rs-Psm crossveins 2–4; Psm-Psc crossveins, gradates, marginal forked and unforked veins dark (Fig. 56B). Forewing length (1.8–2.1 cm); width (0.64–0.72 cm). Hindwing acute. Pterostigma with well-developed basal dark mark. Venation green, except apex of Rs, gradates, marginal forked branches and apical costal crossveins dark (Fig. 56B). Length (1.44 cm); width (0.46 cm) = ratio (3.13).

ABDOMEN. — Green with yellow mid-line and red marks on tergites 2, 3, 6 and 7 (Fig. 56E). **Male:** Ectoproct apically truncate. Sternites 8 and 9 not fused; with many microtholi. Gonarcus thick, with vertically quadrate lateral arms. Gonocornua long, slightly sinuous, medially slanted. Arcessus short, double apodemes basally and with strong apical hook without small lateral lobes (Fig. 56H, I). **Female:** Spermathecae curved, ventral impression short. Bursa convoluted with pair of filamentous accessory glands (Fig. 56F, G). Subgenitale sclerotized, antero-medial part elevated above membrane.

MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 10 February 1998, Freitas, S. (1♂1♀); 10 March 1999, Freitas, S. (1♂); **Mato Grosso:** Itiquira, 20 January 1997, Freitas, S. (3♂1♀)(rubber)(SDF/CAS); 23 January 1997, Freitas, S. (1♂1♀)(rubber); 13 September 1998, Freitas, S. (1♀)(CAS).

Leucochrysa (Nodita) melanocera Navás, 1916

DIAGNOSIS. — This species is most notable for the lack of markings—both on the face and metanotum. Also, abdominal markings, although present on all segments, are quite small. The distinctive spotting pattern of the mesonotum and second axillary sclerite indicate a fairly close relationship with *L. (N.) barrei* and *L. (N.) parallela*, but *L. (N.) barrei* has dark palpi and gena, and both have pale antennae. The pentagonal-shaped subgenitale and distinctly two-parted spermathecal vela can also help distinguish this species.

HEAD. — Yellow. Frons, clypeus and gena without dark markings. Maxillary and labial palpi pale. Vertex with two dark marks anteriorly and weak red marks on raised medial area. Scape and pedicel with broad, dorso-lateral dark stripes; flagellum dark.

THORAX. — Pronotum greenish yellow with thin, lateral, red stripes widening at apices. Mesoprescutum with black spots laterally; mesoscutum with pair of dark spots medially. Second

axillary sclerite with dark spot (Fig. 57A). **Wings:** Pterostigma with faint dark spot basally. Forewing venation pale with costal crossvein endings, origin of radial sector, first Rs-Psm crossveins, middle part of Rs and adjacent veins, gradates, and forked marginal veins dark. Length (1.77 cm): width (0.65 cm) = ratio (2.72). Hindwing acute. Venation pale, except costal crossveins, middle part of Rs and some marginal forks dark (Fig. 57B). Length (1.52 cm): width (0.50 cm) = ratio (3.04).

ABDOMEN. — Yellowish green. Tergites with lateral dark red spots (Fig. 57A). **Female:** Spermatheca with vela divided into two parts (Fig. 57C). Bursa with pair of filamentous accessory glands. Subgenitale pentangular (Fig. 57D).

MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 18 February 1996, Freitas, S. (1♀)(rubber).

Leucochrysa (Nodita) rodriguezi (Navás, 1913a)

DIAGNOSIS. — This is one of a large group of species with red gena, dorso-lateral stripes on the scape, crescent-shaped marks on the vertex, dark red lateral stripes on the pronotum, and dark area at mid-length of forewing Rs. It is one of six species of this group with dark antennae found in Brazilian agro-ecosystems. Of these species, only *L. (N.) marginalis* has similar small linear dark markings on the mesoscutum. However, *L. (N.) marginalis* has no abdominal tergite markings and has a distinctive subapical, truncate plate on the arcessus. The gonocornua with dorso-basal tooth is a distinctive feature of *L. (N.) rodriguezi* found in no other species.

HEAD. — Yellow with red markings. Vertex with pair of oblique, crescent-shaped red marks on medial raised area. Small red spot between antennal bases. Gena red. Maxillary and labial palpi pale. Scape with dark red dorso-lateral stripe; pedicel with small dorso-lateral dark spot; flagellum black, basal antennomeres laterally more intensively black (Fig. 58A, D).

THORAX. — Yellowish green. Pronotum with lateral red stripes. Mesoscutum pale with pair of medial red spots and premesoscutum with pair of lateral, diffuse, pale red spots. Metanotum pale, without marks (Fig. 58A). Pterostigma with dark basal mark. Forewing venation green, except costal crossveins 5–15, origin of Rs, Rs-Psm crossveins 1–6, apex of Rs, inner gradates 5–7 and outer gradates 7–9, and Psm-Psc crossveins dark. Length (16.9–17.8 mm); width (5.3–6.4 mm). Hindwing venation pale, except costal crossveins 7–10, and outer gradates dark (Fig. 58B). Length (1.44 cm): width (0.47 cm) = ratio (3.06).

ABDOMEN. — Yellow with pair of small red stripes on each tergite (Fig. 58C). **Male:** Apex of ectoproct with several long setae. Sternites 8 + 9 fused and apically bilobed; with many microtholi (Fig. 58E). Gonarcus thick, only slightly arched; lateral arms short, ovate. Gonocornua elongate, forcipate with dorso-basal tooth. Arcessus with dorso-medial, subapical, acute projection and ventrally decurved apical hook flanked by small, rounded lateral lobes. Gonosaccus with few scattered setae (Fig. 58G, H). **Female:** Cavity between subgenitale and sternite 8 large and sclerotized, with tiny microtrichia. Subgenitale apically bilobed, with anterio-medial projection. Spermatheca short with ventral impression short. Apex of spermathecal duct strongly dilated (Fig. 58I).

MATERIAL EXAMINED. — **Brazil: São Paulo** – Jaboticabal, 27 August 1996, Domenici, M. G. (1♀); 29 August 1995, Ferreira, R. J. (1♂)(CAS); 3 November 1989, Jacob, M. (1♂)(orange); 9 October 1989, Carmo, O. B. (1♀); 23 March 1996, Fernandes, O. A. (1♀); 9 August 1996, Freitas, S. (1♂); Taquaritinga, 4 September 1993, Xavier, A. L. Q. (1♀)(orange); 4 September 1993, Narciso, R. (1♂)(orange); Birigui, 21 February 1996, Scomparin, C. H. J. (1♂)(corn); **Mato Grosso:** Itiquira, 9 November 1999, Freitas, S. (1♂)(rubber); 10 September 1996, Scomparin, C. H. J. (1♀)(rubber); 14 December 1996, Scomparin, C. H. J. (1♀)(rubber); **Bahia:** Juazeiro, 6 March 1996, Ferreira, R. J. (2♂)(cashew nut).

Leucochrysa (Nodita) affinis de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “São Paulo: Jaboticabal, 5 June 1995, Freitas, S.” (orange).

DIAGNOSIS. — This is a member of a group of species with the dorsal surface of the scape completely red, while the ventral surface is completely pale. All species in this group appear to have at least some dark markings on the mesonotum. *Leucochrysa (N.) affinis* appears intermediate with the group of species having oblique dark marks at the posterior part of the pronotum, and is the only species with completely red dorsal scape to have oblique dark marks on the pronotum. A similar species is *L. (N.) cruentata*, which has the dark dorsal side of the scape, dark flagellum, and extensive segmental markings on the abdominal tergites. It also has large, angled gonocornua, but they are forcipate and rather evenly tapered in *L. (N.) cruentata*, whereas the gonocornua of *L. (N.) affinis* are distinctively flattened, widened at mid-length, and apically divergent. *Leucochrysa (N.) affinis* actually appears most closely related to *L. (N.) guataparensis*, which does not have a completely red dorsal surface on the scape, but has markings more like two longitudinal stripes partially fused along the mid-line. The male gonocornua of both species are highly flattened, but in *L. (N.) guataparensis* they are triangular, while in *L. (N.) affinis* they are strongly elbowed. *Leucochrysa (N.) affinis* also has dark antennae, which are pale in *L. (N.) guataparensis*.

The name *affinis* is Latin for “related to” and refers to the close relationship of this species to *L. (N.) guataparensis*.

HEAD. — Yellow. Gena red. Vertex with V-shaped red mark behind antennal bases. Maxillary and labial palpi pale. Scape red dorsally, pale ventrally; pedicel and flagellum black (Fig. 59A,D).

THORAX. — Pronotum pale green with lateral red stripe, fused at posterior-lateral margin with second, oblique, thin, red mark on posterior half (Fig. 59A). Meso and metanotum pale, unmarked. **Wings:** Forewing pterostigma with faint dark mark basally. Venation green; except costal crossveins, R-Rs crossveins, gradates, and apices of marginal forks dark. Length (1.76 cm): width (0.64 cm) = ratio (2.75). Hindwing pterostigma with well-developed dark mark basally. Venation pale, except middle part of Rs and contiguous veins, gradates, and apices of marginal forks dark (Fig. 59B). Length (1.47 cm): width (0.48 cm) = ratio (3.06).

ABDOMEN. — Green with red marks (Fig. 59C). **Male:** Microtholi on sternite 8 + 9. Gonarcus short and broad, with ovate lateral arms. Gonocornua dorso-ventrally flattened and broadly expanded at mid-length, apically pointed with divergent apices. Arcessus basally broad, without dorsal horns; decurved apical hook without well-developed lateral lobes (Fig. 59E,F). **Female:** Spermatheca short; ventral impression short. Bursa convoluted with pair of filamentous accessory glands.

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 4 December 1996, Freitas, S. (3♂ paratypes)(orange)(SDF/CAS); **Mato Grosso:** Itiquira, 5 April 1996, Scomparin, C. H. J. (1♂ paratype)(rubber); 20 January 1997, Freitas, S. (1♀ paratype)(CAS); 16 August 1997, Freitas, S. (8♂2♀ paratypes)(rubber).

Leucochrysa (Nodita) barrei de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Itiquira, MT, 2-IX-97, Scomparin, C. H., SP79 ♂” (rubber).

DIAGNOSIS. — This is one of the species with well-defined dark spots on the mesoscutum. Of these species, *L. (N.) clepsydra* has a small spot rather than dorso-lateral stripe on the scape, dark red spots rather than lateral stripe on pronotum, and prominent dorsal horns of the arcessus. Unlike *L. (N.) barrei*, *L. (N.) ictericus* has pale palpi, no second axillary sclerite markings, and basally and apically toothed gonocornua. *Leucochrysa (N.) melanocera* has pale palpi, thin lateral pronotal stripes, and

small dark markings on all abdominal tergites. The highly arched form of the arcessus and gonocornua, as well as small ventral lobe at mid-length of the gonocornua are unique to *L. (N.) barrei*.

This species is dedicated to Lionel Barré, who enthusiastically initiated the use of chrysopids for biological control of rubber tree pests in Brazil.

HEAD. — Yellow. Frons and clypeus pale, unmarked. Gena with small red stripe near frons. Maxillary palpi basally pale, dark in middle, and apical half of apical segment pale. Labial palpi pale (Fig. 60C, D). Vertex yellow, unmarked. Scape with dorsolateral red stripe; pedicel with apical dark ring; flagellum pale.

THORAX. — Pronotum pale with irregular, lateral, thin, dark red stripe. Mesonotum with pair of dark circular spots submedially. Mesonotal second axillary sclerite red basally. Metanotum pale, unmarked (Fig. 60A). **Wing:** Forewing pterostigma faintly darkened basally. Venation green, except costal, radial and Psm-Psc crossveins, gradates, and apices of marginal forks dark. Length (2.75 cm); width (1.0 cm) = ratio (2.75). Hindwing pterostigma with well-developed dark basal spot. Venation green, except apex of Rs and outer gradates dark (Fig. 60B). Length (2.30 cm); width (0.75 cm) = ratio (3.07).

ABDOMEN. — Green with dark marks on tergites 3 and 4. **Male:** Abdominal sternites without microtholi. Gonarcus short, with no vertical arch; lateral arms ovate, longer than high (Fig. 60E). Gonocornua slender, forcipate and decurved, with small ventral lobe at mid-length (Fig. 60F). Arcessus strongly arched high above gonocornua, with subapical lateral ridge and decurved apical hook. Gonosaccus without gonosetae.

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) confusa de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Fraiburgo, SC, 26-IX-99, Maçã, SP83, Borges R." (apple).

DIAGNOSIS. — This is one of four species in the region which have the origin of the radial sector heavily shaded. Two of these, *L. (N.) cruentata* and *L. (N.) gossei*, have darkened dorsal surface of the scape and belong to another species group. *Leucochrysa (N.) confusa* appears to be closely related to *L. (N.) maculata*, but *L. (N.) maculata* has heavy dark markings below the antennae on the frons which forms a complete or interrupted band across the frons and the male gonarcus has a short vertical plate dorso-medially.

The name "confusa" comes from the Latin *confusio* meaning mixture or disorder, and refers to the difficulty in interpreting the male genitalia of this species.

HEAD. — Yellow with red markings. Vertex pale, without markings, except red spot behind each antennal base. Gena with red stripe extending slightly onto frons. Frons pale, without markings. Scape with dorso-lateral dark brown stripe; pedicel pale with apical dark ring; flagellum pale.

THORAX. — Cervical sclerite red (Fig. 61A,C). Pronotum green with thin lateral red stripe on anterior half. Mesonotum with irregular dark marks on prescutum and scutum. Metanotum pale, without markings (Fig. 61A). **Wing:** Forewing pterostigma with well-developed dark spot basally. Venation pale, except costal and R-Rs crossveins, origin of Rs and Ma, inner gradates, Psm-Pscu crossveins, apex of forked and unforked marginal veins, and anal veins dark. Origin of Rs, inner gradates, and last Psm-Pscu crossvein shaded. Forewing length (1.3 cm); width (0.41 cm) = ratio (3.17). Hindwing venation pale, except costal, R-Rs crossveins and inner gradates dark. Length (1.12 cm); width (0.34 cm) = ratio (3.29) (Fig. 61B).

MALE ABDOMEN. — Green with red markings on tergites 2, 6, and 7 (Fig. 61G); densely covered by long setae on tergites and sternites (Fig. 61H). Microtholi absent. Gonarcus arched, thick with short, narrow lateral arms. Gonocornua elongate, apically forcipate and embracing arcessus. Arcessus

slender and apically decurved with apical hook flanked by vertical plate-like lobes. Gonosaccus with numerous tiny gonosetae with large bases (Fig. 61, D, E, F).

MATERIAL EXAMINED. — Known only from the holotype.

***Leucochrysa (Nodita) cornuta* de Freitas and Penny, new species**

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Guaira, SP, 12-XII-97, Angelini, M. R.” (corn).

DIAGNOSIS. — This is one of a group of species best defined by elements of the male genitalia. The gonocornua are long and relatively straight, and the arcessus has a pair of subapical dorsal horns and sharply decurved apex. Other members of this group include: *L. (N.) clepsydra*, *L. (N.) cruentata*, *L. (N.) lenora* Banks (1944), and *L. (N.) nitcheroyana* (Navás, 1926). Of these species *L. (N.) cruentata* and *L. (N.) nitcheroyana* have a completely dark dorsal surface of the scape, complete lateral pronotal stripe, dark palpi, and curved, forcipate gonocornua. *Leucochrysa (N.) lenora* is a more northern species with red spots below each antenna on the frons, but unlike *L. (N.) cornuta* the antennal scape dorsally is heavily marked with a dorso-lateral stripe that expands apically to encompass the whole surface, the pronotum only has a pair of small dark spots at the antero-lateral margins, and the mesonotum has extensive dark markings along the anterior margin of the prescutum and laterally on the scutum. However, the male genitalia are almost identical. Even so, the non-genitalic character states are so different as to preclude these being regional variants.

The name “cornuta” comes from the Latin *cornutus*, which means horned, and refers to the cone-like shape of the lateral arms of the gonarcus.

HEAD. — Green. Gena with dark red mark near frons (Fig. 62C). Frons pale, without markings. Maxillary and labial palpi pale. Vertex pale, except for dark red continuation of scape stripe onto antennal base. Scape with dorso-lateral dark red stripe; pedicel pale with apical dark ring; flagellum pale (Fig. 62A).

THORAX. — Green. Pronotum pale with thin, lateral dark red stripe on anterior half. Mesonotum pale with pair of small irregular dark marks on prescutum and scutum (Fig. 62A). **Wings:** Forewing pterostigma with faintly dark basal spot. Venation green, except anterior junction of costal crossveins, apical radial crossveins, middle part of Rs, inner and outer gradates, vertex of intramedian cell, Psm-Pscu crossveins, and hind marginal crossveins dark (Fig. 62B). Length (1.54 cm): width (0.56 cm) = ratio (2.75). Hindwing venation green, except costal and R-Rs crossveins dark (Fig. 62B). Length (1.30 cm): width (0.43 cm) = ratio (3.02).

ABDOMEN. — Green; tergites with red markings; sternites 2–8 with numerous microtholi. **Male:** Gonarcus strongly arched, with ovate lateral arms. Gonocornua elongate, evenly tapered, slightly sinuous at mid-length. Arcessus with two well-developed subapical horns and decurved, apico-medial hook. Gonosaccus with few scattered setae (Fig. 62D, E, F).

MATERIAL EXAMINED. — Known only from the holotype.

***Leucochrysa (Nodita) forciformis* de Freitas and Penny, new species**

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled “Bra-MT-Itiquira, P. E. Michelin, 20/I/97, SP41B, ♂, Freitas, S.” (rubber).

DIAGNOSIS. — This species is a member of a group of species with bifurcate apices to the gonocornua. Members of the group also have pale palpi, a dark dorsal abdominal stripe and dark markings at the lateral margins of the meso- and metascutellum. However, *L. (N.) forciformis* can be distinguished from *L. (N.) forcipata* and *L. (N.) furcata* by the broad lateral pronotal stripe, by the dark transverse band behind the antennal bases, and broadly contiguous bases of the gonocornua.

The name comes from the Latin *forceps* meaning pincer-like, and *forma* meaning form, referring to the shape of the bifurcate apices of the gonocornua.

HEAD. — Yellow. Clypeus and frons with diffuse red coloration. Gena pale, unmarked. Vertex with broad, transverse brown band behind antennal bases; pair of indistinct parallel red stripes on raised medial area (Fig. 63D). Maxillary and labial palpi pale. Scape with diffuse reddish brown spot; pedicel pale with apical dark ring; flagellum black.

THORAX. — Yellow. Pronotum pale with broad, dark, lateral stripe. Meso- and metanota with dark lateral stripe and lateral margin of meso- and metascutellum (Fig. 63A). **Wings:** Forewing pterostigma with large dark spot basally. Venation green, except apex of Rs and adjacent crossveins, gradates, forked and unforked marginal veins, anal veins, and hind margin dark. Veins in anal area more intensively darkened. Length (1.88 cm); width (0.62 cm) = ratio (3.03). Hindwing venation green, except apex of Rs, gradates, apices of forked and unforked marginal veins, and hind margin dark. Anal region more intensively darkened (Fig. 63B). Length (1.65 cm); width (0.50 cm) = ratio (3.30).

ABDOMEN. — Microtholi present. Tergites dark, forming dark medial stripe (Fig. 63C). **Male:** Gonarcus thick; strongly arched in broad V-shape; lateral arms broadly flattened. Gonocornua with broad, contiguous bases and bifurcate, decurved hooks apically. Arcessus short, without subapical horns or plate, apico-medial decurved hook with poorly developed lateral lobes. Gonosaccus with gonosetae on conspicuous conical bases in two lateral pockets, most medial gonosetae longer and most lateral gonosetae shorter; area beneath gonocornua with small sclerotized pits on membrane (Fig. 63E, F). **Female:** Spermatheca short, with many coils. Bursa with pair of filamentous accessory glands (Fig. 63G).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 17 July 1995, Freitas, S. (1 ♀ paratype); **Mato Grosso:** Itiquira, 20 January 1997, Freitas, S. (2 ♀ paratypes)(rubber).

Leucochrysa (Nodita) furcata de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, 20-I-97, Scomparin, C. H., V.216, SP41D" (rubber).

DIAGNOSIS. — This species is a member of the group of species easily distinguished by the bifurcate gonocornua. Within the group, this species has a shorter arcessus, and shorter gonocornua with apical teeth of unequal length. Additionally, it does not have the development of dark coloration on meso- and metascutellum that the nominate species has. It can be separated from *L. (N.) forciformis* by the lack of dark band behind the antennae, lack of dark lateral stripes on meso- and metanota, and widely separated bases of the gonocornua of *L. (N.) furcata*. However, the most distinctive feature (found in no other species) is the pair of sclerotized sacs at the apex of sternite 8 + 9 in males of *L. (N.) furcata*.

The name "furcata" is derived from the Latin *furca*, meaning fork-bearing, which refers to the bifurcate apex of the gonocornua.

HEAD. — Yellow. Clypeus and frons with diffuse red pigmentation. Gena pale, unmarked. Vertex diffuse red with anterior pair of short, convergent, dark stripes (Fig. 64F). Maxillary and labial palpi pale. Scape with broad reddish spot; pedicel pale with apical dark ring; flagellum dark.

THORAX. — Green. Pronotum green with reddish brown stripe laterally. Mesoscutum and scutellum pale with small lateral red mark. Metascutellum pale with dark red lateral mark, remainder of metanotum pale green (Fig. 64A). **Wings:** Forewing pterostigma with well-developed dark mark basally. Venation pale, except costal crossveins, R-Rs crossveins, Rs-Psm crossveins, Psm-Psc crossveins, apex of Rs, gradates, marginal forks and anal veins dark. Length (0.93 cm); width (0.31 cm) = ratio (3.00). Six inner and eight outer gradate crossveins (Fig. 64B). Hindwing acute. Pterostigma with well-developed dark mark basally. Venation pale, except R-Rs crossveins, gradates,

marginal forks, apex of Rs, and hind marginal veins dark (Fig. 64B). Length (0.81 cm): width (0.25 cm) = ratio (3.24). Five inner and eight outer gradate crossveins.

ABDOMEN. — All tergites dark, forming longitudinal dark stripe (Fig. 64C). **Male:** Apex of sternite 8 + 9 with pair of laterally raised, sclerotized sacs and tiny medial denticles (Fig. 64 D, E). Gonarcus slightly arched, thick, with rounded lateral arms. Gonocornua short, with divided, two-pronged apex. Arcessus narrow, elongate, without subapical horns or plate, with apical decurved, medial hook, but lateral lobes not well developed. Gonosaccus with numerous gonosetae (Fig. 64G, H). **Female:** Spermatheca short, once coiled. Bursa with tiny denticles and pair of filamentous accessory glands (Fig. 64I, J).

OTHER MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 18 August 1998, Freitas, S. (1 ♀ paratype)(rubber).

Leucochrysa (Nodita) guataparensis de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Luiz Antonio, SP, Faz. Guatapara, T. 22, Celpav, 27/07/92, Freitas, S." (eucalyptus)

DIAGNOSIS. — This species has a bird's-head-shaped arcessus. The only two other species with this shape are *L. (N.) lancala*, from which it can be distinguished by the pale palpi and broad and apically decurved gonocornua, and *L. (N.) affinis*. The oblique pronotal markings and flattened gonocornua probably indicate a close relationship between these two species. They can be separated by the dark flagellum and broadly triangular shape of the gonocornua of *L. (N.) guataparensis*.

The name "guataparensis" refers to the small town of Guatapara, in which the primary type specimen was collected.

HEAD. — Yellow. Gena red. Vertex pale with V-shaped red mark behind antennal bases. Frons pale with small red spot between and below antennae. Maxillary and labial palpi pale. Scape pale with two dorsal red stripes medially fused; pedicel pale with apical dark ring; flagellum pale, but basal antennomeres darkly shaded on anterior surface (Fig. 65A, D).

THORAX. — Green. Pronotum pale with dark red lateral stripe; pair of thin, oblique dark lines fused to lateral stripes at posterior-lateral corners. Mesonotum pale with red mark at lateral margin of prescutum (Fig. 65A). Metanotum pale yellow, without markings. **Wings:** Forewing pterostigma heavily pigmented basally. Venation green, except costal crossveins, middle part of Rs and adjacent crossveins, inner and outer gradates, apices of unforked and first forked marginal veins dark (Fig. 65B). Length (1.58–1.78 cm); width (0.53–0.64 cm). Hindwing pterostigma darker basally than in forewing. Venation green, except costal crossveins, middle part of Rs, inner and outer gradates and forked marginal veins dark (Fig. 65B). Length (1.47 cm): width (0.50 cm) = ratio (2.94).

ABDOMEN. — Tergites pale, with red markings (Fig. 65C). **Male:** Microtholi present. Gonarcus only slightly arched, lateral arms small, elongate triangular. Gonocornua, in lateral view, sharply elbowed and broadly expanded at mid-length, apically decurved; in dorsal view, a broad triangular plate with apical point. Arcessus short, broadly triangular, with subapical bird's-head-shaped curve, in lateral view; apically decurved as small medial hook and undeveloped lateral lobes (Fig. 65E, F). **Female:** Subgenitale well-sclerotized, with pair of heavily sclerotized lateral tubercles caudally. Spermathecae short, sinuous. Bursa with pair of filamentous accessory glands (Fig. 65G, H, I).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Luiz Antonio, 1 June 1994, Freitas, S. (1 ♂ paratype)(eucalyptus); Jaboticabal, S. (1 ♀ paratype), 30 March 1996, Freitas, S. (1 ♀ paratype); 4 December 1996, Freitas, S. (1 ♀ paratype); **Mato Grosso:** Itiquira, 20 January 1997, Freitas, S. (1 ♂ paratype)(rubber); 17 February 1997, Scomparin, C. H. J. (4 ♂ paratypes)(rubber).

Leucochrysa (Nodita) ictericus de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Birigui, SP, 21-I-96, Scomparin, C. H. J." (corn).

DIAGNOSIS. — *Leucochrysa (N.) ictericus* is closely related to *L. (N.) rodriguezi*. Both species have a basal tooth on the gonocornua, which is found in no other species. They can be separated by the more dorsal stripe on the scape and larger, more circular spot on the mesoscutum of *L. (N.) ictericus*. However, the most apparent differences are in the male genitalia, where *L. (N.) ictericus* has an unusual gonarcus with lateral arms that project laterally, not anteriorly, with no arch, and the presence of a medio-dorsal lobe. Neither of these characteristics is found in any other species of *Leucochrysa (Nodita)*. The gonocornua are also distinctively elongate, with an apical notch.

The name comes from the Greek *ikterikos* meaning jaundiced or yellow and refers to the basic body coloration.

HEAD. — Yellow with red markings. Vertex pale with pair of oblique crescent-shaped red marks on raised medial area. Frons pale with small red spot between antennal bases. Gena red, extending as red suffusion on clypeus. Maxillary and labial palpi amber. Scape with mid-dorsal red stripe, pedicel pale with apical black ring; flagellum dark, with basal antennomeres intensely black ventro-laterally (Fig. 66A, C, D).

THORAX. — Yellow. Legs pale. Pronotum pale with lateral red stripes extending to lateral tip of mesoprescutum. Mesoscutum with submedial, circular red spot (Fig. 66A). Metanotum pale, without markings. **Wings:** Forewing pterostigma with faint dark spot basally. Venation pale, except costal crossveins, R-Rs crossveins, Rs-Psm and Rs-lg crossveins, and gradates dark. Gradate series divergent. Length (1.55–1.69 cm); width (0.5 cm). Hindwing pterostigmatic spot faint. Venation pale, except middle costal crossveins, R-Rs transverse veins, middle part of Rs and posterior inner gradates dark; darkness of crossveins not as intense as on forewing. Length (1.33–1.47 cm); width (0.39–0.47 cm) (Fig. 66B).

ABDOMEN. — Yellow with faint red spots. **Male:** Gonarcus not arched; lateral arms flat, ovate, at right angle to arcessus; dorso-medial, caudally-directed lobe with apical tooth. Gonocornua elongate, tips bifid; large, apically-directed basal tooth. Arcessus broad, with decurved apical hook flanked by apically truncate membranous lobes. Gonosaccus with sparse gonosetose (Fig. 66E, F, G). **Female:** Spermatheca short with long spermathecal duct (Fig. 66I). Subgenitale with posterior-lateral lobes and long antero-medial projection (Fig. 66J, H).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Birigui, 21 November 1996, Scomparin, C. H. J. (1 ♂ paratype)(corn); Taquaritinga, 4 September 1993, Xavier, A. L. Q. (1 ♂ 1 ♀ paratypes)(orange); Jaboticabal, 13 February 1991, Freitas, S. (1 ♀ paratype)(CAS); 9 August 1996, Freitas, S. (1 ♂ paratype)(orange); March 1996, Freitas, S. (1 ♂ 3 ♀ paratypes)(SDF/CAS); 30 June 1992, Pessoa, R. (1 ♂ paratype); 27 October 1995, Freitas, S. (1 ♀ paratype); 23 March 1996, Fernandes, O. A. (1 ♀ paratype); 18 March 1998, Freitas, S. (1 ♀ paratype); 14 March 1995, Seguin, L. D. (1 ♀ paratype); Nova Europa, 21 October 1996, Bergman, L. G. (1 ♀ paratype)(rubber).

Leucochrysa (Nodita) incognita de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, 30-XII-96, Scomparin, C. H. J." (rubber).

DIAGNOSIS. — The short, twisted shape of the gonocornua is distinctive. We have not seen this form in any other species and this feature should be sufficient for recognition of the species.

The name "incognita" comes from the Latin *incognitus* meaning unknown or strange, and refers to the bizarre shape of the male gonocornua.

HEAD. — Yellow. Frons and vertex without markings. Gena red (Fig. 67C). Maxillary palpimeres pale, except four and basal half of five dark. Scape faintly darkened; pedicel pale with apical dark ring; flagellum dark.

THORAX. — Pale, unmarked. **Wing:** Forewing pterostigma with dark mark basally. Venation green, except first 15 costal crossveins, base and apex Rs, and inner and outer gradates dark. Length (1.47 cm): width (0.55 cm) = ratio (2.67). Hindwing pterostigma with well-developed, dark mark basally. Venation pale, except gradates and costal crossveins somewhat dark (Fig. 67A). Length (1.19 cm): width (0.39 cm) = ratio (3.05).

ABDOMEN. — Pale, unmarked. Dorsal apodeme of ectoproct heavily sclerotized and forked near callus cerci. Apical half of sternite 8 + 9 strongly tapered (Fig. 67B). **Male:** Lateral arms of gonarcus ovate, with irregular margins; strongly arched and curved. Gonocornua short, twisted. Arcessus narrow with straight medial hook flanked by small lateral lobe. Gonosaccus with sparse gonosetae (Fig. 67D).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) interata de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Jaboticabal, SP, 20-X-93, Marucci, R. (cotton).

DIAGNOSIS. — The combination of character states which help define this species include: thin, red marks from frons to tentorial pits, dark spots on mesonotum, and pronotum with medial spots or lateral stripe extensions. Three other species also share this suite of character states: *L. (N.) affinis*, *L. (N.) camposi*, and *L. (N.) parallela*. Unlike *L. (N.) interata*, *L. (N.) affinis* has dark dorsum of the scape, dark antennae, and no dark metanotal markings. *Leucochrysa (N.) parallela* also has no dark metanotal markings and no medial spots on the pronotum. Probably the most closely related species is *L. (N.) camposi*, which has more extensive markings of meso- and metanotum and abdominal tergites than *L. (N.) interata*. Additionally, the slender elongate spermatheca and broad antero-medial projection of the subgenitale are distinctive for *L. (N.) interata*.

The name "interata" comes from the Latin *inter* meaning between and *atus* meaning pertaining to, and refers to the apex of the spermathecal gland which is neither hairy (the usual state for chrysopids) nor bearing small plates.

HEAD. — Yellow. Frons and clypeus unmarked. Gena with small red spot near frons. Maxillary and labial palpi pale. Vertex yellow with pair of crescent-shaped red stripes on raised medial area. Scape and pedicel with red stripe dorso-laterally; flagellum pale, with basal antennomeres dark on lateral margin (Fig. 68A, C, D).

THORAX. — Pronotum green, with pair of black punctures at mid-length; red stripe weakly defined laterally. Mesoprescutum and scutum pale, with pair of diffuse red marks. Metanotum pale, with pair of pale red marks (Fig. 68A). **Wing:** Pterostigma with faint dark mark basally. Forewing venation green, except apical forks and basal radial and medial crossveins dark. Inner and outer gradates pale (Fig. 68B). Forewing length (1.93 cm): width (0.72 cm) = ratio (2.68). Hindwing length (1.64 cm): width (0.54 cm) = ratio (3.04).

ABDOMEN. — Pale; tergites 1 and 2 with red marks (Fig. 68E). **Female:** Spermatheca long; ventral impression short. Surface of spermathecal duct apex smooth, neither hairy nor with tiny plates. Subgenitale with broad, heavily-sclerotized antero-medial projection (Fig. 68F, G).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) lineata de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Luiz Antonio, SP, Fz. Guatapara, T.25, Celpav, ♂, 1-X-92, SP41, Freitas, S." (eucalyptus).

DIAGNOSIS. — There is a group of species that has dark abdominal tergites that form a continuous dark dorsal stripe and apically bifurcate gonocornua of the male genitalia. Among these species there appears to be a progression from *L. (N.) rodriguezi* which has only crescent-shaped marks on the abdomen, arched gonarcus, and narrow gonocornua with only a slight indication of apical bifurcation; to *L. (N.) ictericus* with a complete abdominal stripe, flattened gonarcus with lateral arms at right angles to the arcessus, and narrow gonocornua with slightly bifurcate apices; to *L. (N.) lineata* with gonocornua greatly swollen basally and apically cleft (or hooked). Intermediate stages of this development can be observed in the male genitalia of *L. (N.) michelini*, *L. (N.) retusa*, and *L. (N.) tabacinus*. However, the differences among individual species in this grouping are so striking that they could not be considered as variants of a single species. This group of species appears to be confined to southern South America.

The name "lineata" is derived from the Latin *linea* meaning line or thread, and refers to the dark medial line on the abdominal tergum of this species.

HEAD. — Yellow. Maxillary and labial palpi amber. Gena pale, unmarked. Indistinct reddish brown transverse band at clypeal-frontal suture; small dark red spot below antennae on mid-line. Vertex with pair of divergent red stripes, which at anterior end form dark red double spot. Scape suffused red dorsally, pale ventrally; pedicel pale with apical dark ring; flagellum black (Fig. 69C).

THORAX. — Pronotum green, with broad brown stripe laterally. Mesoprescutum brown laterally along prescutal-scutal suture; scutum with two interconnected brown marks on either side; scutellum with post-lateral brown dot. Metascutum and scutellum with large brown marks submedially (Fig. 69A). **Wing:** Forewing pterostigmal spot faint. Venation green, except origin of Rs, Rs vein for first five cells and contiguous crossveins, gradates and marginal forks dark. Length (1.58 cm): width (0.56 cm) = ratio (2.82). Hindwing venation pale, except apex of Rs and contiguous crossveins, gradates and marginal forks dark (Fig. 69B). Length (1.41 cm): width (0.45 cm) = ratio (3.13).

ABDOMEN. — Tergites dark, forming dark mid-line (Fig. 69D). Microtholi present on sternite 8 + 9. **Male:** Tiny lanceolate gonocristae at apex of sternite 8 + 9. Gonarcus slender, only slightly arched; lateral arms almost in straight line. Gonocornua basally greatly swollen, with medially curved, apico-lateral hook. Arcessus with apically-decurved medial hook flanked by pair of rounded, membranous lobes. Gonosaccus with gonosetae on conspicuous conical bases in pair of lateral pockets; anterior to field of gonosetae, field of tiny linear pits below gonocornua on lateral margins of gonosaccus (Fig. 69E, F).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) maculosa de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Taquaritinga, SP, Brasil, 1-93, Fz. São Jose, Xavier, A. L. Q." (orange).

DIAGNOSIS. — Almost all species of *L. (Nodita)* with heavy shading of forewing crossveins [e.g., *L. (N.) postica*] also have a dark apex of the hindwing. The heavy shading of forewing crossveins combined with pale apex of the hindwing is unusual. Of the species with heavy shading of the forewing crossveins, only *L. (N.) maculosa* has a flagellum which is basally dark and pale after the first two segments. The short spermatheca is also unknown in other species of *Leucochrysa*. In this respect, it more closely resembles species of Chrysopini with cordate spermatheca, such as *Chrysoperla externa* and *Plesiochrysa brasiliensis*.

The name "maculosa," from the Latin *macula* meaning spot or mark, refers to the heavily margined crossveins in the forewing, which gives this species the appearance of having spotted forewings.

HEAD. — Pale yellow. Frons green with wine red marks below antennal bases from eye margin to medial margin of antennae and ventrally to below anterior tentorial pit. Vertex green with antennal fossa wine red. Maxillary palpi pale basally, dark on fourth and basal half of apical segment, pale on apical half (Fig. 70D). Scape with dorso-lateral and medial red stripes fused dorsally; pedicel pale with apical dark ring; first two antennomeres dark, apical segments pale (Fig. 70A).

THORAX. — Cervical sclerites red. Pronotum green with pair of oblique wine red marks on posterior 2/3. Mesoprescutum pale with brick red mark along lateral margin, extending onto scutum near wing base. Metanotum pale, without markings (Fig. 70A). **Wings:** Fore- and hindwing pterostigma with well-developed dark mark basally. Venation green, except origin of Rs, apical radial crossveins, Psm-Psc crossveins, gradates and apical forks dark and heavily shaded. Length (1.47 cm): width (0.54 cm) = ratio (2.72). Hindwing venation green (Fig. 70B). Length (1.24 cm): width (0.40 cm) = ratio (3.10). Tarsal claws without basal expansion.

ABDOMEN. — Green, with red spot on second tergite. **Female:** Spermatheca short, thick, not coiled; ventral impression broad basally (Fig. 70C).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) michelini de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Jaboticabal, SP, XI-96, Tosi, E. ♂".

DIAGNOSIS. — This species is a member of a group having dark abdominal tergites and flattened gonocornua with apical hook [see discussion under *L. (N.) lineata*]. Of the members of this group with swollen bases of the gonocornua, *L. (N.) tabacinus* has less enlarged gonocornua with bifid apex (not hooked), and broadly widened arch of the gonarcus. The marks on the vertex also appear smaller and on metanotum much more developed in *L. (N.) tabacinus*. The most similar species to *L. (N.) michelini* is *L. (N.) lineata*, which has the same inflated gonocornua, but the lateral arms of the gonarcus have no arch, forming a straight line perpendicular to the arcessus. *Leucochrysa (N.) lineata* also appears to have more dark pigmentation on the mesonotum than *L. (N.) michelini*.

The name was given in honor of P. E. Michelin who has given financial support to the senior author for chrysopid research.

HEAD. — Yellow. Vertex pale with U-shaped red mark on raised medial area interrupted at mid-line and darker anteriorly. Scape with diffuse red spot dorsally; pedicel pale with apical dark ring; flagellum black. Maxillary and labial palpi amber. Gena pale, unmarked. A diffuse red transverse band on either side of clypeal-frontal suture. Small red spot below and between antennae (Fig. 71D).

THORAX. — Pronotum green with broad brown lateral stripe. Middle part prescutum dark; two crescent-shaped marks on mesoscutum. Submedial part of metascutum and lateral portion of scutellum dark brown (Fig. 71A). **Wing:** Forewing pterostigma slightly darkened basally. Venation green; except most of costal crossveins, apex of Rs and contiguous veins, gradates and marginal forks dark. Length (1.68 cm): width (0.58 cm) = ratio (2.90). Hindwing apically acute. Pterostigma with faint darkening basally. Venation green, except apex of Rs and contiguous veins black (Fig. 71B). Length (1.44 cm): width (0.45 cm) = ratio (3.20).

ABDOMEN. — Microtholi present. Tergites dark, forming dark mid-line (Fig. 71C). **Male:** Gonarcus strongly arched with rounded lateral arms. Gonocornua broadly expanded plates with apical decurved hook. Arcessus short; subapical horns and plate absent; decurved apico-medial hook present with lateral lobes flattened or absent. Gonosaccus with numerous setae on large conical bases

arranged in two lateral fields; field of tiny linear marks present near gonocornua, and directly below gonocornua field of tiny punctures (Fig. 71E, F).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 26 October 1995, Ribeiro, M. C. (1♂ paratype)(orange).

Leucochrysa (Nodita) parallela de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Bra-SP-Jaboticabal, FCAV, 10-III-99, SP58, ♂, Freitas, S." (cotton).

DIAGNOSIS. — The lateral arms of the gonarcus of this species are flattened, rather than vertical, as in other species. The lack of extensive dark markings on the thorax, especially the lateral portion of the metascutellum and minimal abdominal tergite markings also suggest a distant relationship with the *forcipata* group. We know of no other species with such strikingly flattened lateral arms.

The name "parallela" comes from the Latin *parallelus* meaning side by side equidistantly, and refers to the parallel, flattened arms of the gonarcus.

HEAD. — Yellow. Frons and clypeus pale, unmarked. Gena pale with small red spot along frontal suture. Maxillary and labial palpi pale (Fig. 72A, D). Vertex pale, unmarked. Antennal scape pale, with red lateral stripe thin at midlength; flagellum pale.

THORAX. — Pronotum green with lateral red stripe thinner at mid-length. Mesoscutum pale with pair of circular red spots; second axillary sclerite with small red spot (Fig. 72A). **Wings:** Forewing pterostigma faintly darkened basally. Venation green, except costal ends of costal crossveins, middle of R- Rs crossveins, first five Rs-Psm crossveins, gradates, Psm-Psc crossveins, forked and unforked marginal veins, and apices of anal veins dark (Fig. 72B). Length (1.40 cm): width (0.50 cm) = ratio (2.80). Hindwing pterostigma heavily pigmented basally. Venation green, except middle part of Rs and gradates dark (Fig. 72B). Length (1.19 cm): width (0.40 cm) = ratio (2.98).

ABDOMEN. — Tergites pale, with red spots on tergites 2 and 3. **Male:** Gonarcus short, with lateral arms large, rounded, truncate posteriorly, with latero-apical, decurved point. Arcessus angulate in lateral view; distal half with thin, semimembranous and apically divergent ridges; terminal hook flanked by paired membranous lobes (Fig. 72E, F). Ectoproct heavily sclerotized; ventral branch of dorsal apodeme extends to postventral corner of ectoproct as highly sclerotized, obtuse point. Microtholi absent.

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, October 1992, Delfino, T. H. (1♂ paratype)

Leucochrysa (Nodita) retusa de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, "Balsamo, SP, 29-IX- September 1997, Bergman, E." (rubber).

DIAGNOSIS. — Males of this species appear to have a less developed state of swollen gonocornua and hooked or bifurcate apex, such as found in *L. (N.) lineata* and *L. (N.) tabacinus*. Perhaps the most similar species is *L. (N.) furcata*, which is part of the group of species with bifid gonocornua. Like *L. (N.) retusa*, *L. (N.) furcata* has short, relatively broad gonocornua, and relatively few meso- and metanotal markings. However, *L. (N.) retusa* does not have the darkened abdominal tergites of this species. The thin, quadrate-shaped gonarcus with small lateral arms and broad arcessus are distinctive for *L. (N.) retusa*.

The name "retusa" comes from the Latin *retusus* meaning blunted or notched, and refers to the unusual squared arch of the gonarcus.

HEAD. — Yellow, without marks. Maxillary palpimeres basally pale; third, fourth and half of fifth segments dark. Scape pale with dark dorso-lateral mark; pedicel pale with dorso-lateral dark mark; flagellum pale (Fig. 73A).

THORAX. — Cervical sclerite red. Pronotum with thin dark red stripe laterally on anterior 2/3. Meso- and metanotum pale, unmarked (Fig. 73A). **Wings:** Forewing pterostigma faintly darkened basally. Venation green, except junctures of costal crossveins, R-Rs crossveins, gradates, and marginal forked veins dark (Fig. 73B). Length (1.44 cm); width (0.53 cm) = ratio (2.72). Hindwing pterostigma dark basally. Venation pale, except middle part of Rs and gradates dark. Length (1.24 cm); width (0.41 cm) = ratio (3.02).

ABDOMEN. — Pale, except tergite 2 with pair of triangular red spots. **Male:** Medial arch of gonarcus thin, quadrate. Gonocornua widely spaced, flattened, with apico-lateral hook. Arcessus broad, with subapical transverse ridge; decurved apico-medial hook with poorly developed lateral lobes. Gonosaccus with few, scattered, large gonosetae (Fig. 73C, D).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) robusta de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, SP, 7-IX-99, PEM, 28, Freitas, S." (rubber).

DIAGNOSIS. — This species shares with *L. (N.) santini* a dorsal scape stripe, dark pronotal stripe which expands posteriorly, absence of meso- and metanotal markings, and quite short gonocornua. However, *L. (N.) santini* has dark basal palpimeres and almost straight gonocornua in dorsal view, which are also slightly larger and more closely spaced than in *L. (N.) robusta*.

The name "robusta" comes from the Latin word *robustus*, meaning hard and strong like an oak, and refers to the thick arch of the gonarcus with broad arcessus.

HEAD. — Pale yellow. Gena pale, with transverse red band close to frons. Frons green, without markings. Maxillary palpimeres pale (Fig. 74A). Vertex green, without marks (Fig. 74A, D). Scape pale, with dorso-lateral red stripe not reaching dorsal and ventral margins; pedicel pale, with dark marks; flagellum pale.

THORAX. — Green. Pronotum pale, glabrous, with irregular red mark on lateral margin expanded posteriorly (Fig. 74A). Mesonotum and metanotum pale, without markings. **Wings:** Forewing pterostigma faintly darkened basally. Venation green, except crossvein endings, and inner and outer gradates dark. Apex of intramedian vein reaches Psm after first Rs-Psm crossvein. Length (1.33–1.51 cm); width (0.5–0.56 cm). Hindwing pterostigma darkened basally. Venation green, except costal crossveins, radial crossveins 7–9, apex of Psm, and inner and outer gradates dark. Length (1.17–1.25 cm); width (0.30–0.43 cm) (Fig. 74B).

ABDOMEN. — Green. Tergites with dark red marks. Sternites 2–8 with microtholi. **Male:** Gonarcus large, thick, strongly-arched, with ovate lateral arms. Gonocornua small, laterally curved. Arcessus broad; without subapical horns or plate; decurved apico-medial hook with lateral lobes forming two small ridges (Fig. 74F). **Female:** Spermatheca cordate at apex, continuing to mass of convoluted tubes; spermathecal duct contorted, terminally expanded; ventral impression wide, swollen; accessory glands short, stout, tubular. Subgenitale short; with thin-walled, pocket-like medial extension (Fig. 74G, H).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, 19 November 1995, Freitas, S. (1♀ paratype); Luiz Antonio, 13 August 1992, Freitas, S. (1♂ paratype)(corn); 27 July 1992, Freitas, S. (1♂2♀ paratypes); **Mato Grosso:** Itiquira, 7 September 1999, Freitas, S. (1♂ paratype)(rubber).

Leucochrysa (Nodita) santini de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Jaboticabal, SP, 28-VII-1995, Freitas, S."

DIAGNOSIS. — This species has few distinctive characteristics. The shape of the lateral pronotal stripe, similar abdominal markings and small unmodified gonocornua would indicate a closer relationship with *L. (N.) robusta* than with other species. The two species can be separated by the dark palpi and straight shape of the gonocornua of *L. (N.) santini*.

The name was given in honor of Prof. Santin Gravena who provided some specimens for this study.

HEAD. — Pale yellow. Gena red. Frons green, without dark markings. Maxillary palpimeres pale basally; palpimeres 3–4 and basal part of 5 dark; apex of palpimere 5 pale. Vertex green, without markings (Fig. 75A, D). Scape with dorso-lateral red stripe, not reaching basal or apical margins (Fig. 75A); pedicel pale with dark marks; flagellum pale.

THORAX. — Green. Pronotum pale with bright red marginal stripe abruptly broadened posterior to mid-length (Fig. 75A). Mesonotum pale with dark red markings. Metanotum pale, without markings. **Wings:** Forewing pterostigma faintly darkened basally. Venation green, except junctions of crossveins, and inner and outer gradates dark. Apex of intramedian cell reaches Psm after the first Rs-Psm crossvein. Length (1.28–1.58 cm); width (0.47–0.58 cm) (Fig. 75B). Hindwing pterostigma strongly darkened basally. Venation green, except costal crossveins and gradates dark (Fig. 75B). Length (1.21 cm); width (0.40 cm); ratio = (3.03).

ABDOMEN. — Green. Tergites with dark red markings on segments 3, 4, 5, 7, and 8 (Fig. 75C). Sternites 2–8 with many microtholi. **Male:** Gonarcus thick, strongly arched, with vertically oriented, ovate lateral arms. Gonocornua small, straight, apically decurved. Arcessus without subapical horns or plate; apically decurved hook flanked by small, lateral ridges. Gonosaccus with scattered gonosetae (Fig. 74E, F). **Female:** Spermatheca multiply-coiled, ventral impression small with many turns (Fig. 34G).

OTHER MATERIAL EXAMINED. — **Brazil: São Paulo:** Jaboticabal, August 1996, Freitas, S. (1 ♀ paratype)(CAS); Luiz Antonio, 25 August 1992, Freitas, S. (2 ♂ paratypes)(eucalyptus); 27 July 1992, Freitas, S., (1 ♂ paratype)(eucalyptus)(CAS); **Minas Gerais:** Belo Horizonte, 2 September 1991, Kumagai, A. (2 ♂ paratypes).

Leucochrysa (Nodita) scomparini de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, 18-XI-96, Scomparin, C. H. J." (rubber).

DIAGNOSIS. — Females of this species are immediately recognizable and separable from all other known species by the apical, tight double coil, which forms a knob at the end of the spermatheca (Fig. 76E). The extensive dark meso- and metanotal markings and dark abdominal tergites relate this species to a group in which males have enlarged, flattened gonocornua that are apically bifid or hooked [see discussion of *L. (N.) lineata*].

This species is dedicated to the enthusiastic entomologist Cassio Henrique Junqueira Scomparin, who has attempted to use chrysopids in biological control of agricultural pests.

HEAD. — Yellow with red markings. Vertex pale, with lateral red stripe close to ocular margins; convergent crescentic stripes on raised medial area (Fig. 76A). Scape pale, with red dorso-lateral stripe and short medial stripe; pedicel pale with red ring; flagellum pale. Gena red. Frons pale with small red spot below and between antennal bases. Maxillary and labial palpi pale (Fig. 76C).

THORAX. — Pronotum yellowish green, with red spots at the antero-lateral corner and pair of red spots at postero-medial margin. Mesonotum pale with extensive red and brown marks, prescutum

medially with red spots and laterally brown; scutum and postscutum with reticulate brown marks; mesoscutellum pale medially, brown laterally. Metanotum broadly brown (Fig. 76A). **Wings:** Forewing and hindwing pterostigma with dark brown spot basally. Venation pale, except costal juncture of costal crossveins, origin of radial sector, middle part of Rs, gradates, forked marginal veins, and apices of marginal unforked veins dark. Length (1.66 cm): width (0.66 cm) = ratio (2.52). Hindwing venation pale, except costal crossveins, middle part of Rs, gradates and forked marginal veins dark (Fig. 76B). Length (1.44 cm): width (0.48 cm) = ratio (3.00).

ABDOMEN. — Green. Tergites 4–7 with large, dark spots (Fig. 76A). **Female:** Spermatheca short, vela with two tight apical rings. Bursa much folded, with pair of filamentous accessory glands. Subgenitale wide, with short antero-medial projection (Fig. 76D, E).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) squamiseta de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, “Birigui, SP, Fz. São Joaquim, 11/June/94, SP68, Scomparin, C. H. J.” (corn).

DIAGNOSIS. — The swollen and darkened, second anal vein of the forewing is similar to the basal markings of *Ceraeochrysa tauberae* from Costa Rica (Penny 1997), but is otherwise unknown in *L. (Nodita)*. The contorted subapical ridges of the arcessus is also a characteristic unique to this species. The extensive red markings of the head are not often seen in this subgenus, but there are a few other species with similar markings, such as *L. (N.) aleura* (Banks, 1944), *L. (N.) morrisoni* (Navás, 1914), and *L. (N.) trifurcata* (Banks, 1948). However, no other species of *L. (Nodita)* has the distinctive, thickened gonosetae, some of which have basal plates.

The name “squamiseta” comes from the Latin *squama* and *seta* meaning scaly hairs, and refers to the scattered large gonosetae on large conical bases or flat plates of the gonosaccus.

HEAD. — Pale yellow. Clypeus pale, marked with narrow red band between eyes through clypeus under anterior tentorial pit; broader medially. Frons pale with narrow, red, double concentric ring below antennal sockets fused at mid-line and continued dorsally as a narrow median stripe. Vertex pale, with red partial ring at base of each scape continued postero-laterally as a narrow stripe along eye margin; pair of submedial, parallel, red stripes. Labial and maxillary palpi pale. Scape with dorsal surface red, ventral surface pale; pedicel and flagellum pale (Fig. 77A, C).

THORAX. — Pronotum wider than long, yellow-green, unmarked. Meso and metanotum pale with diffuse reddish markings; no pale median stripe (Fig. 77A). **Wings:** Fore- and hindwings with dark basal spot. Venation green, except crossveins and bases of longitudinal veins dark; no bordering. Basal fork of second anal veins swollen, darkened and bordered. Forewing with five inner, and seven outer gradates, the series converging posteriorly (Fig. 77B). Forewing length (1.20 cm): width (0.50 cm) = ratio (2.40). Hindwing length (1.08 cm): width (0.34 cm) = ratio (3.18).

ABDOMEN. — Pale. Tergites 3, 4, 6 and 7 with broad dark marks (Fig. 77D). Apex of sternite 9 truncate. Dorsal apodeme of ectoproct extended dorso-medially at apex. Callus cerci black posteriorly. **Male:** Microtholi large, dense on sternites 3–8. Gonarcus thick, broadly arcuate; lateral arms triangular. Gonocornua short, straight, apically obtuse and decurved. Arcessus broad basally, little sclerotized laterally; with low, contorted dorsal ridges at subapical angle, apical hook small, with lateral lobes transverse. Gonosaccus with gonosetae borne subapically on sclerotized, conical projections; ventral pair of thick gonosetae on oval sclerotized bases (Fig. 77E, F, G).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) tabacinus de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, 20-I-97, Scomparin, C. H. J." (rubber).

DIAGNOSIS. — This species is a member of the group of species with completely darkened abdominal tergites and flattened, apically bifid gonocornua. The gonocornua, while well developed in *L. (N.) tabacinus*, are not as swollen as in some other species in the group, such as *L. (N.) lineata* and *L. (N.) michelini*. The lateral arms of the gonarcus, although broadly angled with respect to the medial arch in *L. (N.) tabacinus*, do not form a straight line, as is found in *L. (N.) ictericus* and *L. (N.) lineata*. The extensive brown coloration of thorax and abdomen is also seen in *L. (N.) scomparini*, but unlike *L. (N.) tabacinus*, that species has red gena, completely dark metascutellum, and a distinctive doubly-coiled knob on the spermatheca.

The name "tabacinus" comes from the New Latin for *tabacum* for tobacco and *inus* meaning pertaining to, referring to the extensive tobacco brown coloration of the body.

HEAD. — Yellow. Clypeus and frons without markings, except a small dark spot between and below antennal bases. Gena pale, unmarked. Vertex with short dark stripes antero-medially near antennal bases. Antennal fossa dorsally red. Maxillary and labial palpi pale (Fig. 78C). Scapes pale with diffuse reddish brown spot; pedicel pale, with apical dark ring; flagellum dark.

THORAX. — Pronotum yellow with lateral brown stripe not extended to anterior or posterior margins (Fig. 78A). Mesoprescutum pale with red mark antero-laterally; scutum pale with brown mark posteriorly; mesoscutellum pale with lateral dark suffusion. Metascutum pale with pair of broad submedial brown marks; metascutellum pale medially, with progressively darker suffusion laterally (Fig. 78A). **Wings:** Fore- and hindwing faintly darkened basally. Venation green, except posterior part of costal margin, outer gradates, marginal forks and unforked marginal veins, and anal veins dark; posterior juncture of anal veins and hind margin intensely black. Length (3.06 cm): width (1.06 cm) = ratio (2.89). Hindwing venation green, except apex of Rs and contiguous veins, and apical part of fore- and hind margins dark; marginal junctures of anal veins and base of hind margin dark (Fig. 78B). Length (2.66 cm): width (0.84 cm) = ratio (3.17).

ABDOMEN. — Pale green, except all tergites with dark medial sclerites (Fig. 78G). **Male:** Gonarcus thin, curved, lateral arms continuation of same plane as medial arch. Gonocornua flattened, with apex bifid, decurved. Arcessus short; subapical horns and plate absent; apical decurved medial hook, flanked by rounded, enlarged lateral lobes. Gonosaccus with scattered gonosetae (Fig. 78E, F). **Female:** Spermatheca short. Bursa convoluted and two thick accessory glands (Fig. 78I). Subgenitale highly sclerotized, with long antero-medial projection above large, round sclerotized lobe (Fig. 78D, J).

OTHER MATERIAL EXAMINED. — **Brazil: Mato Grosso:** Itiquira, 20 June 1997, Scomparin, C. H. J." (2♂2♀ paratypes)(rubber).

Leucochrysa (Nodita) tenuis de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Luiz Antonio, SP, Faz. Guatapara, T.25, Celpav, 6/12/93, Freitas, S." (eucalyptus).

DIAGNOSIS. — This is a relatively pale species with few distinctive markings. However, the gonarcus is quite distinct. No other species has the exaggerated, long, parallel lateral sides of the medial arch of this species. The almost complete absence of gonocornua is also quite distinctive.

The name "tenuis" comes from the Latin meaning thin, and refers to incredibly long, thin, lateral sides of the medial arch of the gonarcus.

HEAD. — Yellow. Gena pale, with diffuse red spot near frons (Fig. 79C). Frons pale, with small red spot below and between antennal bases. Maxillary palpmere basally pale; fourth and base of fifth

segments dark; apex pale. Vertex pale, unmarked (Fig. 79C). Scape pale, with dark brown dorso-lateral stripe; pedicel and flagellum pale.

THORAX. — Green. Pronotum with dorso-lateral dark red stripe (Fig. 79A). Meso- and metanotum pale, unmarked. **Wings:** Forewing pterostigma faintly darkened basally. Venation green, except costal crossveins 7–13, apex of Rs, posterior apices of radial crossveins, and forked marginal veins dark (Fig. 79B). Length (1.51 cm): width (0.56 cm) = ratio (2.70). Hindwing pterostigma with well-developed dark spot basally. Venation green, except apex of Rs and forked marginal veins dark. Length (1.34 cm): width (0.41 cm) = ratio (3.27).

ABDOMEN. — Green, without markings. **Male:** Sternites 2–8 with many microtholi. Gonarcus medial arch quadrate, extremely long, thin, and parallel; lateral arms ovate. Gonocornua reduced to small, rounded, basal lobes. Arcessus large, broad; subapical horns and plate absent; apical hook well-sclerotized, not decurved, with lateral lobes well-developed, rounded. (Fig. 79D, E).

MATERIAL EXAMINED. — Known only from the holotype.

Leucochrysa (Nodita) vignisi de Freitas and Penny, new species

TYPE. — Male holotype, deposited at Museu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Itiquira, MT, 10-V-96, Scomparin, C. H. J." (rubber).

DIAGNOSIS. — There are few distinctive features to this species. It appears to be part of a group of species with poorly developed gonocornua and broad, bulging bases to the arcessus. The two species most similar to *L. (N.) vignisi* appear to be *L. (N.) retusa* and *L. (N.) santini*, which also have thin, incomplete stripes on the scape; pale vertex; pale meso- and metanotum; somewhat thin, incomplete lateral pronotal stripes; and sparse, scattered gonosetae. Of the three, *L. (N.) santini* has dark palpi and gena. The gonarcus of *L. (N.) retusa* is much thinner and more quadrate-shaped than in *L. (N.) vignisi*. The shape of the gonocornua separates the three species most easily. The gonocornua of *L. (N.) retusa* are relatively broad, with an apical hook along the lateral edge. The bases of the gonocornua of *L. (N.) santini* are spaced much closer together than in *L. (N.) vignisi*.

This species was dedicated to Berthrand Vignis, who along with L. Barré enthusiastically opened the way for chrysopid use for biological control of rubber plant pests.

HEAD. — Yellow. Frons, palpi, gena and vertex pale, unmarked. Scape pale, with incomplete, thin dorso-lateral black stripe; pedicel and flagellum pale (Fig. 80A).

THORAX. — Pronotum green with medial yellow stripe and thin, lateral red stripe. Meso- and metanotum pale, unmarked (Fig. 80A, C). **Wings:** Fore- and hindwing pterostigma with well-developed dark spot basally. Venation green, except costal junctures of costal crossveins, radial crossveins, apex of Rs, anterior juncture of last medial crossvein, inner and outer gradates, Psm-Psc crossveins, and forked and unforked marginal veins dark. Length (1.48 cm): width (0.56 cm) = ratio (2.64). Hindwing venation green, except costal crossveins, radial crossveins, apex of Rs and forked marginal veins dark (Fig. 80B). Length (1.30 cm): width (0.44 cm) = ratio (2.95).

ABDOMEN. — Green, with yellow mid-dorsal line. Tergites 3, 4, and 7 with dark spots (Fig. 80D). **Male:** Gonarcus strongly arched medially; lateral arms ovate. Gonocornua small, widely spaced, apically forcipate. Entoprocessus broad, well developed; without subapically horns or plate; apico-medial, decurved hook flanked by well-developed rounded ridges. Gonosaccus with many long gonosetae (Fig. 80E, F).

OTHER MATERIAL EXAMINED. — **Brazil: Mato Grosso,** Itiquira, 23 March 1997, Scomparin, C. H. J." (1 ♂ paratype)(rubber).

Leucochrysa (Nodita) vittatus de Freitas and Penny, new species

TYPE. — Female holotype, deposited at Muscu de Zoologia/USP (MZUSP), São Paulo, Brazil, labeled "Rib. Preto, SP, 2/11/91, Vieira, D. A." (orange).

DIAGNOSIS. — This species has a rather atypical appearance for this subgenus. Usually, any dark markings of the pronotum are in the form of lateral stripes and spots, sometimes coupled with oblique stripes. Submedial pronotal stripes seem to be unique to this species. In many ways *L. (N.) vittata* resembles *L. (N.) scomparini* with more extended and exaggerated submedial stripes. Both species have extensive, similar dark markings of head and mesonotum. More extensive darkening of the abdominal stripes found in *L. (N.) vittata* would create the condition seen in *L. (N.) scomparini*. However, there are some significant differences between the two species. The metascutellum on *L. (N.) vittata* is pale, while that of *L. (N.) scomparini* is dark. The dark scape stripe is dorsolateral in *L. (N.) scomparini* and dorsomedial in *L. (N.) vittatus* while *L. (N.) scomparini* has an additional medial spot. The most distinct differences are in the female genitalia, where *L. (N.) scomparini* has a spermatheca with tightly-coiled knob and non-glandular duct, whereas *L. (N.) vittata* has a larger, unknobbed spermatheca and glandular spermathecal duct. *Leucochrysa (N.) vittata* also has an inner gradate series of the hindwing which runs close to the radial sector, while that of other species is more equidistant between Rs and the outer gradate veins.

The name "vittatus" comes from the Latin *vitta* for ribbon, band or stripe and *atus* for provided with, referring to the unusual number of brown stripes on the head and thorax.

HEAD. — Pale green. Gena brown. Frons pale, without markings. Maxillary and labial palpi pale (Fig. 80A, D). Vertex pale with pair of dark parallel stripes on raised medial area, tapered antero-medially to point between antennal bases; lateral pair of dark stripes along eye margin to posterior margin of vertex. Scape with dorso-medial brown stripe continued briefly onto fossa; pedicel and flagellum pale.

THORAX. — Pronotum with submedial brown stripes and small lateral spot each side halfway to posterior margin. Mesoprescutum with three dark marks on either side, continued onto mesoscutum and mesoscutellum, which have additional lateral stripes. Metanotum pale with submedial pair of dark spots and postero-lateral oblique dark stripe. Pleura and metacoxae brown; metafemur pale fuscous, brown banded apically (Fig. 80A). **Wings:** Pterostigma of both wings dark basally. Venation green, except junctures of first ten costal crossveins and all of distal crossveins, radial crossveins distal to stigma, longitudinal veins at juncture with crossveins, and three cells of Rs at mid-length dark. Forewing gradates parallel. Hindwing venation marked as in forewing. Inner series of gradates closer to Rs than in forewing (Fig. 80B). Forewing length (1.59 cm): width (0.53 cm) = ratio (3.00). Hindwing length (1.43 cm): width (0.43 cm) = ratio (3.33).

ABDOMEN. — Pale green. Tergites 2–8 with pair of submedial brown stripes (Fig. 80C). **Female:** Spermatheca short, wide, with constriction between upper and lower chamber; vela region lightly-sclerotized, moderately short; ventral impression short. Spermathecal duct wide, gently undulated, glandular-walled region; longer than spermatheca. Bursa small. Bursal accessory glands not seen. Subgenitale broadly rounded, dorsal lobes deeply incised medially; postero-medial lobe with broad indentation and transverse lip (Fig. 80E, F, G).

MATERIAL EXAMINED. — Known only from the holotype.

FIGURES

A list of abbreviations used with the figures is as follows:

acu = acumen	m2 = second median cell
g = accessory glands	mm = millimeters
al = apical lobe	mp = maxillary palpi
arc = arcessus	u = mediuncus
atp = anterior tentorial pit	og = outer gradates
b = copulatory bursa	pa = paramere
bd = bursal duct	Psc = pseudocubitus vein
cc = callus cerci	Psm = pseudomedia vein
cru = crumena	psp = pseudopenis
dapo = dorsal apodeme	Rs = radial sector
dh = dorsal hood of the gonarcus	S6 = sixth sternite
ent = entoprocessus	S7 = seventh sternite
gc = gonarcus (medial arch)	S8 + 9 = fused eighth and ninth sternite
gcn = gonocornua	sap = subapical projection
gcr = gonocristae	sd = spermathecal duct
gps = gonapsis	T7 = seventh tergite
gsc = gonosaccus	T8 = eighth tergite
gst = gonosetae	T9 + ect = ninth tergite and ectoproct
ig = inner gradates	v = vela
imc = intramedian cell	vapo = ventral apodeme
la = lateral arm of the gonarcus	vb = ventral branch of the dorsal apodeme
lg = lateral gonapophyses	vi = ventral impression
m1 = first median cell	

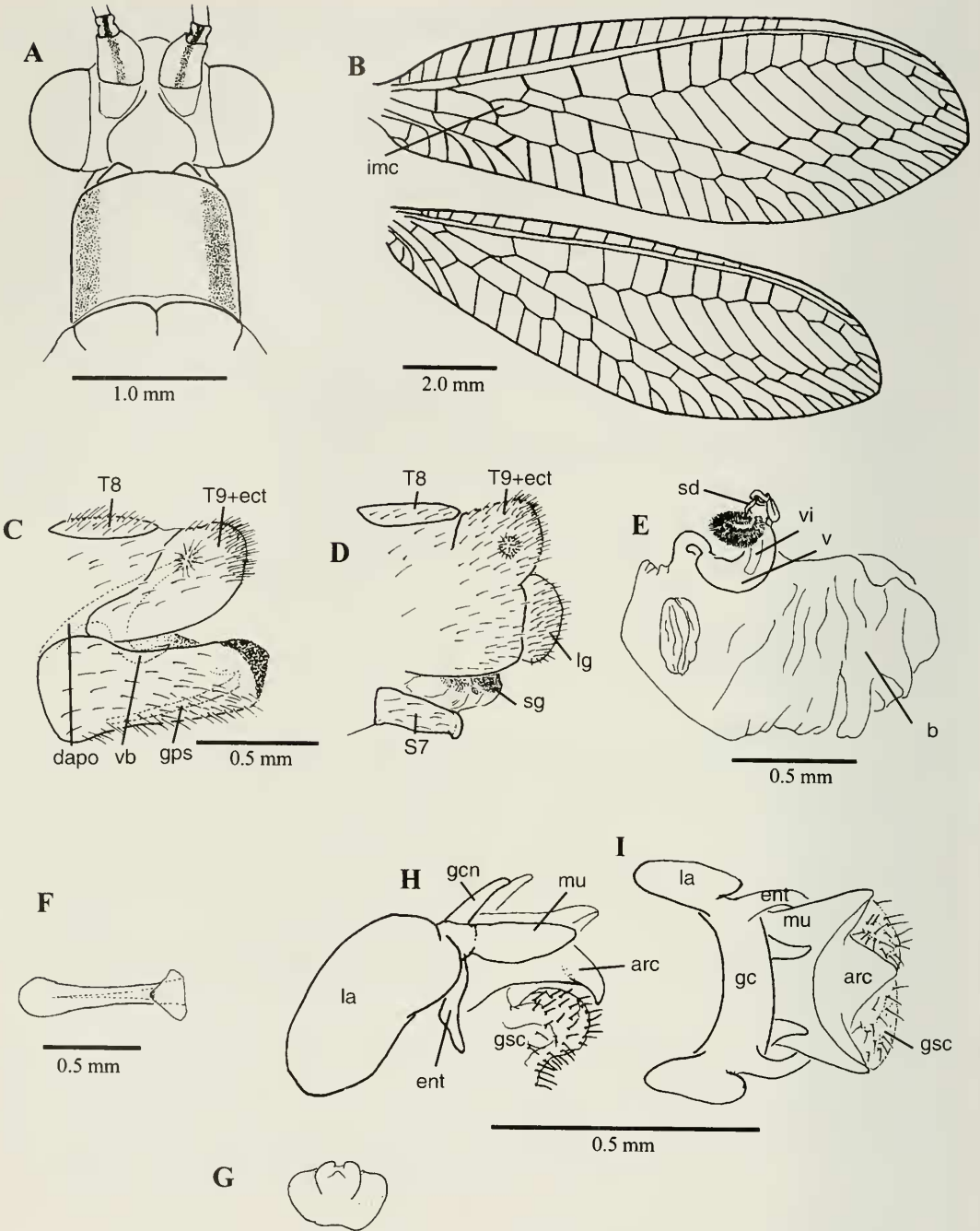


FIGURE 1. *Nacarina panchlora* (Gerstaecker, 1888). A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Maxillary palpi; E. Female genitalia; F. Apex of abdomen; G. Subgenitale.

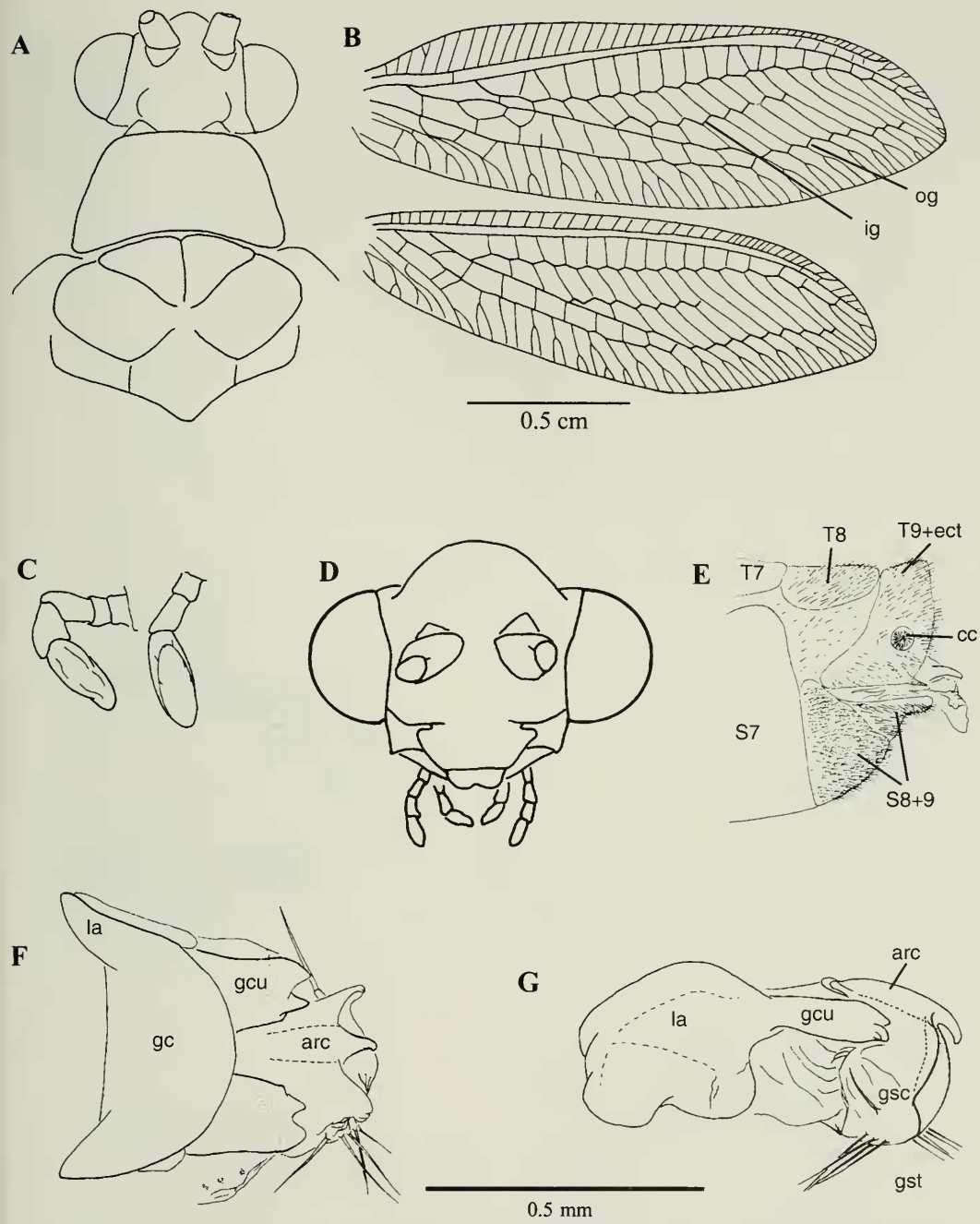


FIGURE 2. *Nacarina pletorica* (Navás, 1919). A. Head and thorax: dorsal view; B. Wings; C. Maxillary palpi; D. Head, frontal view; E. Apex of male abdomen; F, G. Male genitalia, dorsal and lateral view.

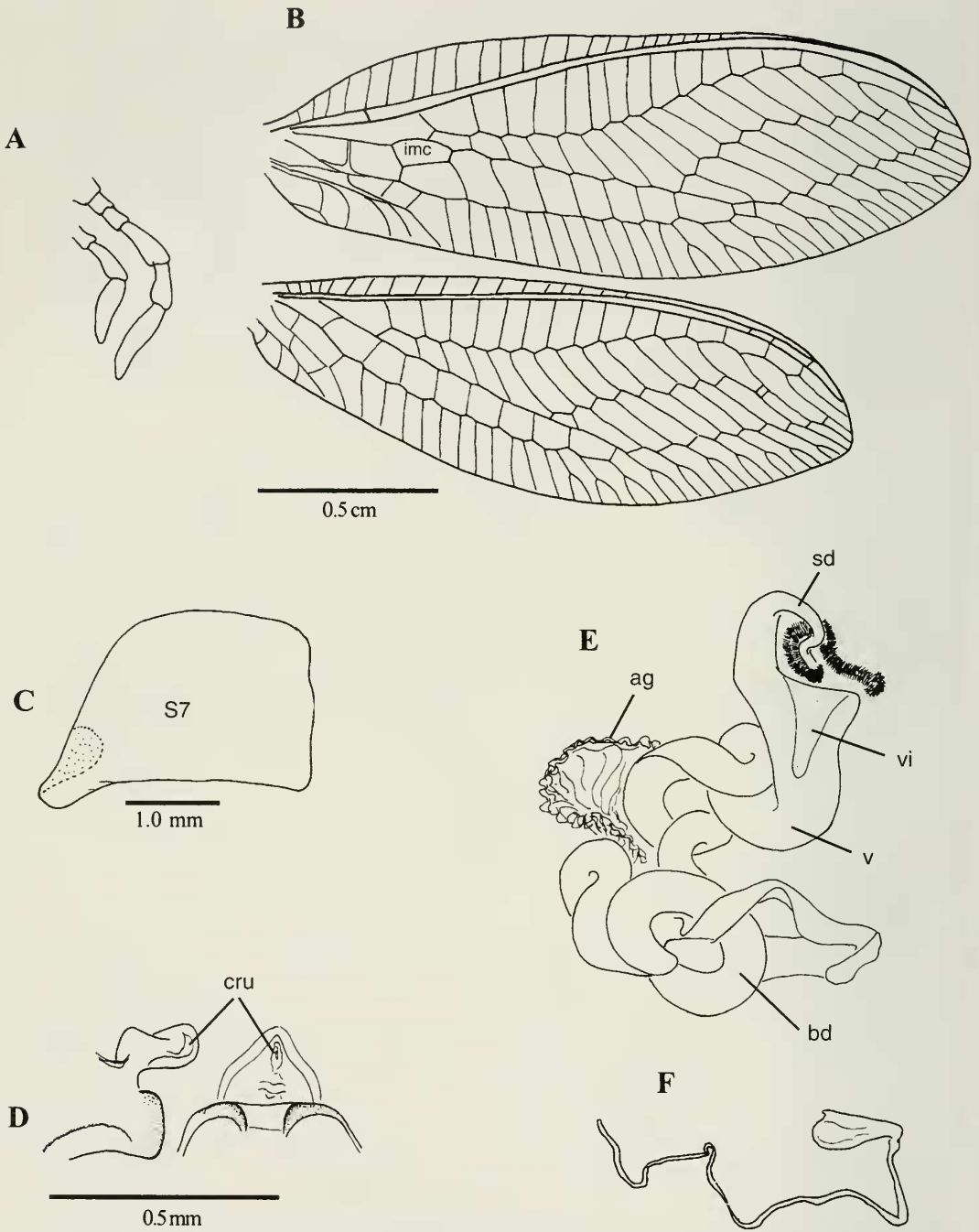


FIGURE 3. *Nacarina wagneri* (Navás, 1924). A. Maxillary and labial palpi; B. Wings; C. Sternite 7; D. Subgenitalia; E. Spermatheca; F. Collateral gland.

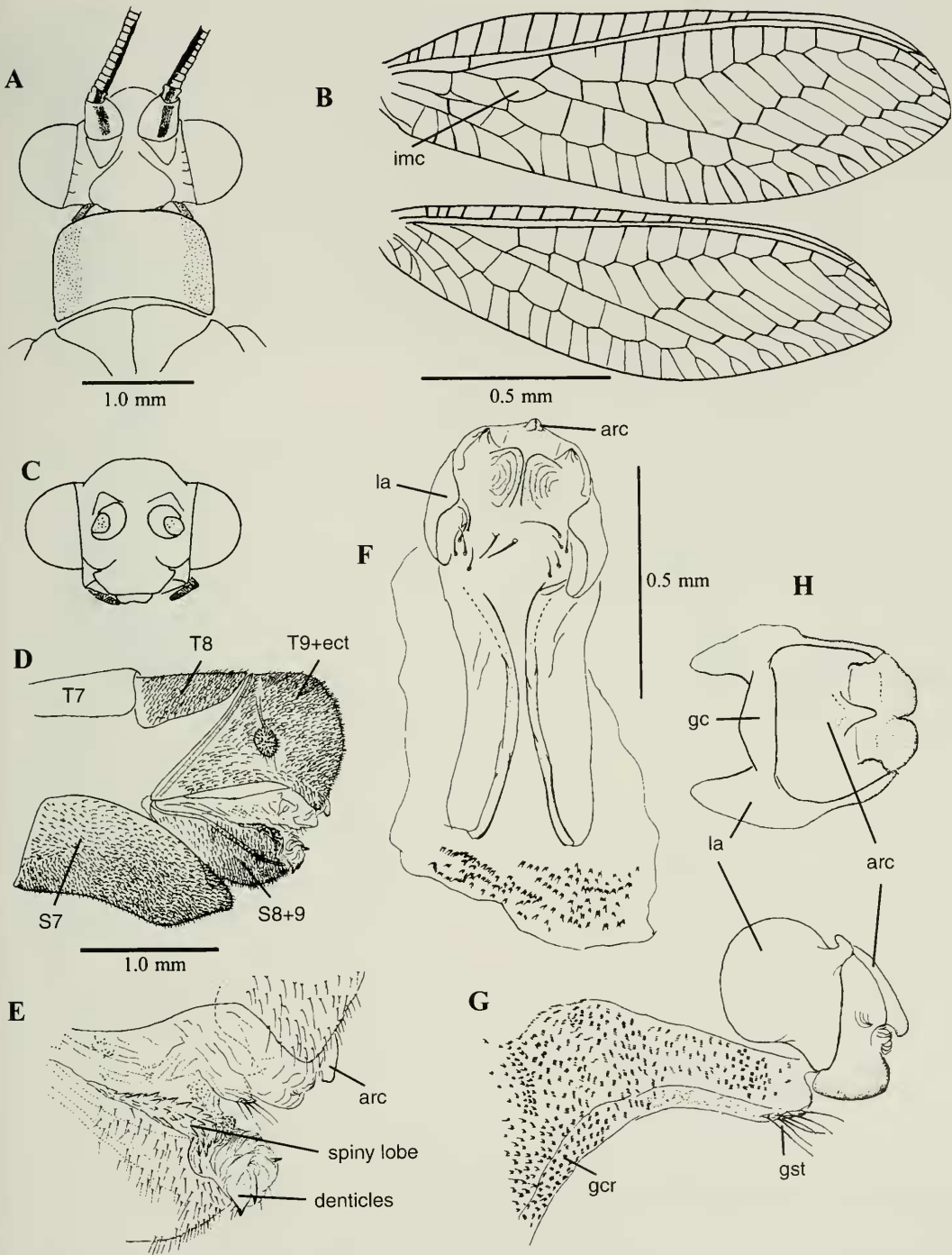


FIGURE 4. *Nacarina aculeata*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen; E. Part of abdominal apex showing the denticles; F, G, H. Male genitalia, ventral, lateral and dorsal view, respectively.

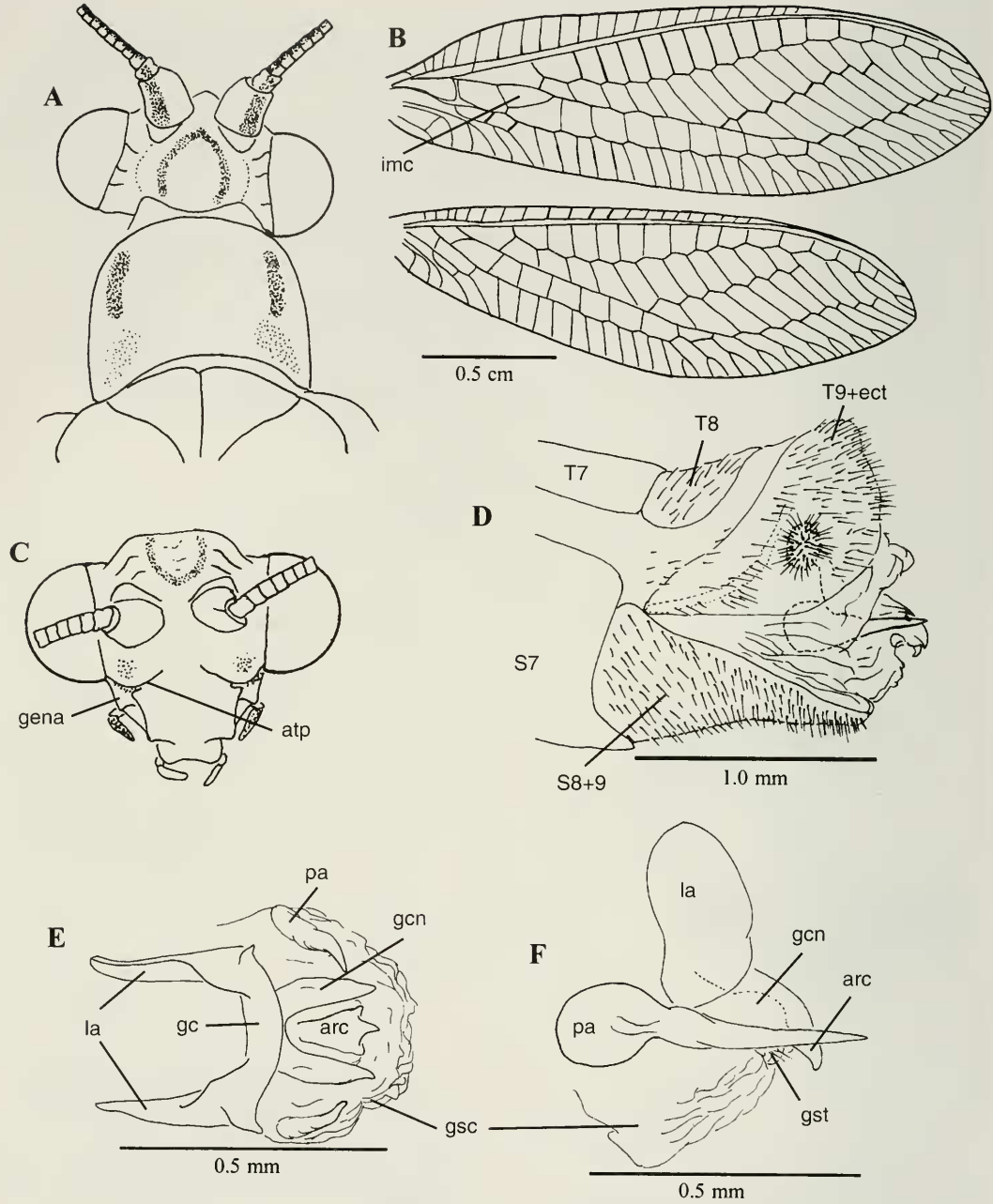


FIGURE 5. *Nacarina gladius*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen; E. Male genitalia, dorsal view; F. Male genitalia, lateral view.

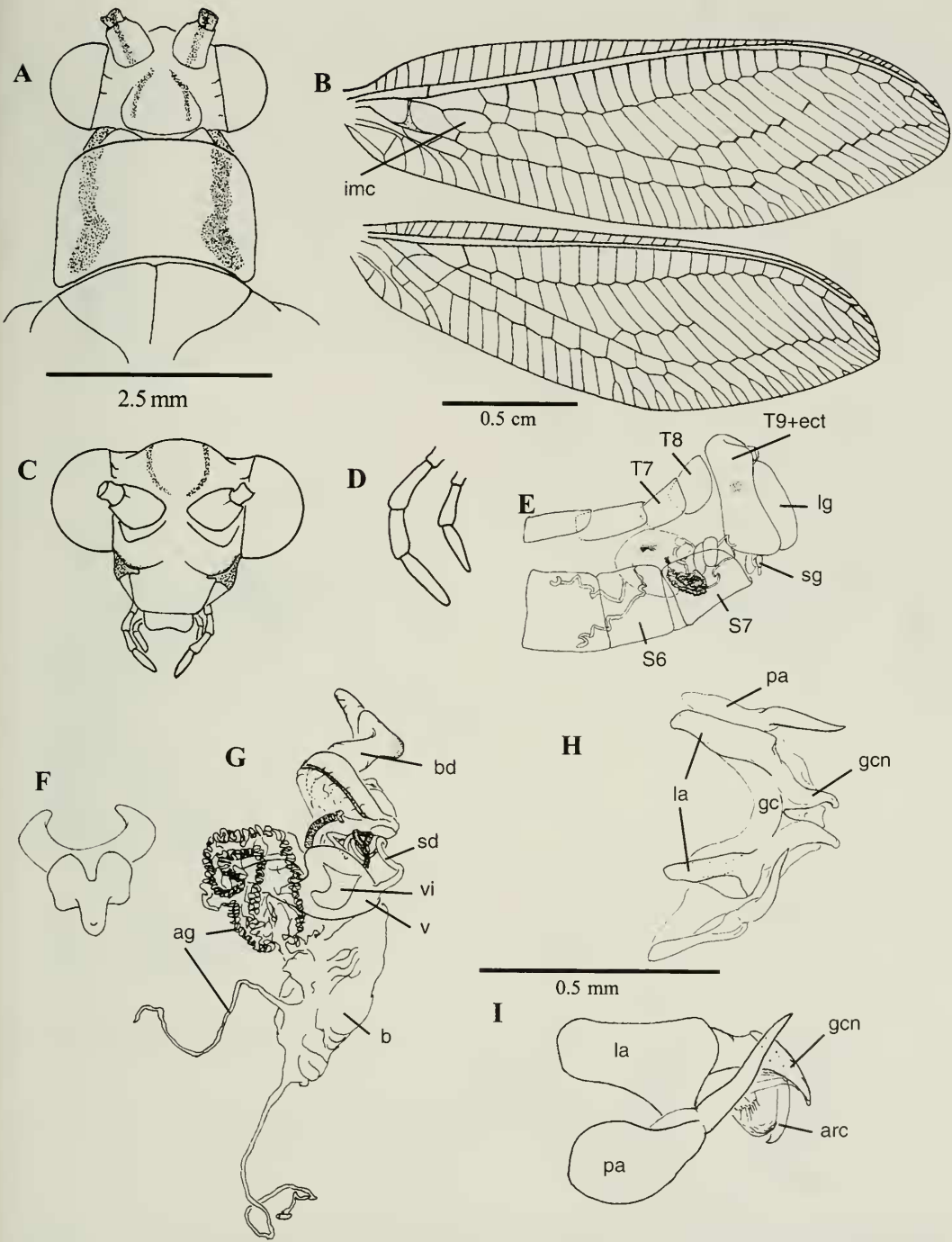


FIGURE 6. *Nacarina lavrasana*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Maxillary and labial palpi; E. Apex of female abdomen; F. Subgenitale; G. Female genitalia; H. Male genitalia, dorsal view; I. Male genitalia, lateral view.

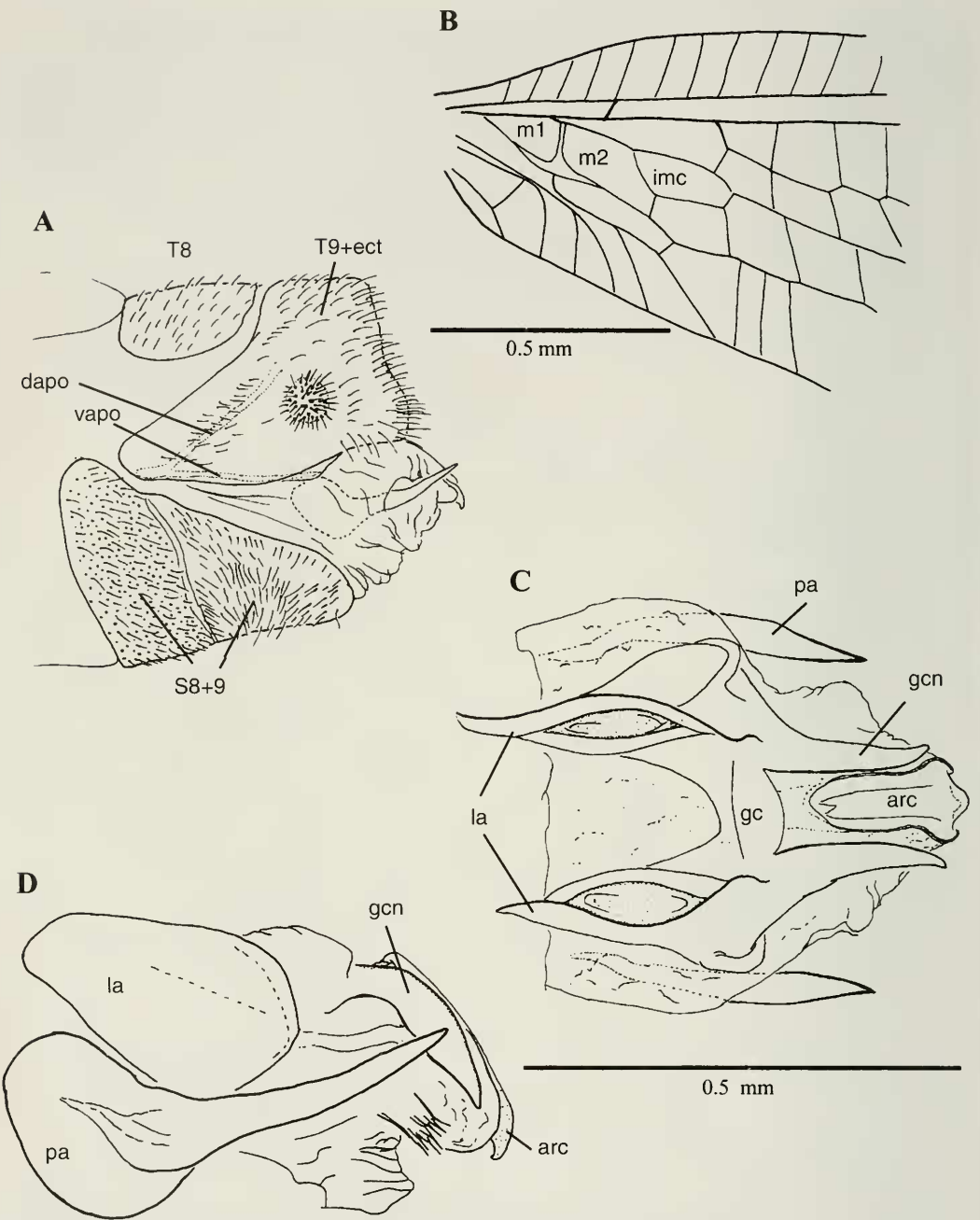


FIGURE 7. *Nacarina sagitta*, new species. A. Apex of male abdomen; B. Wings; C. Male genitalia, dorsal view; D. Male genitalia, lateral view.

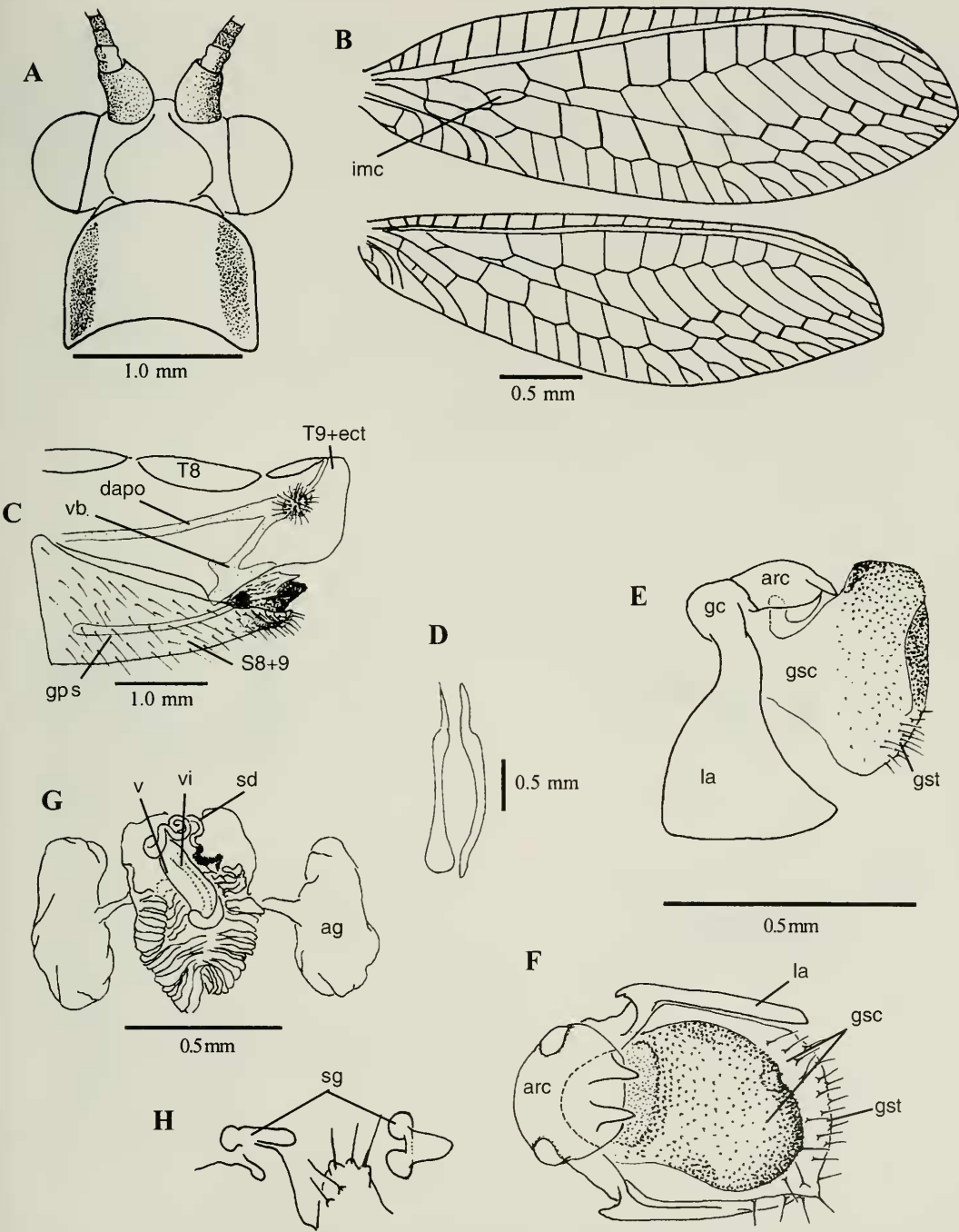


FIGURE 8. *Ceraeochrysa acmon* Penny, 1998. A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen; D. Gonapsis; E. Male genitalia, lateral view; F. Male genitalia caudal view; G. Female genitalia; H. Subgenitale.

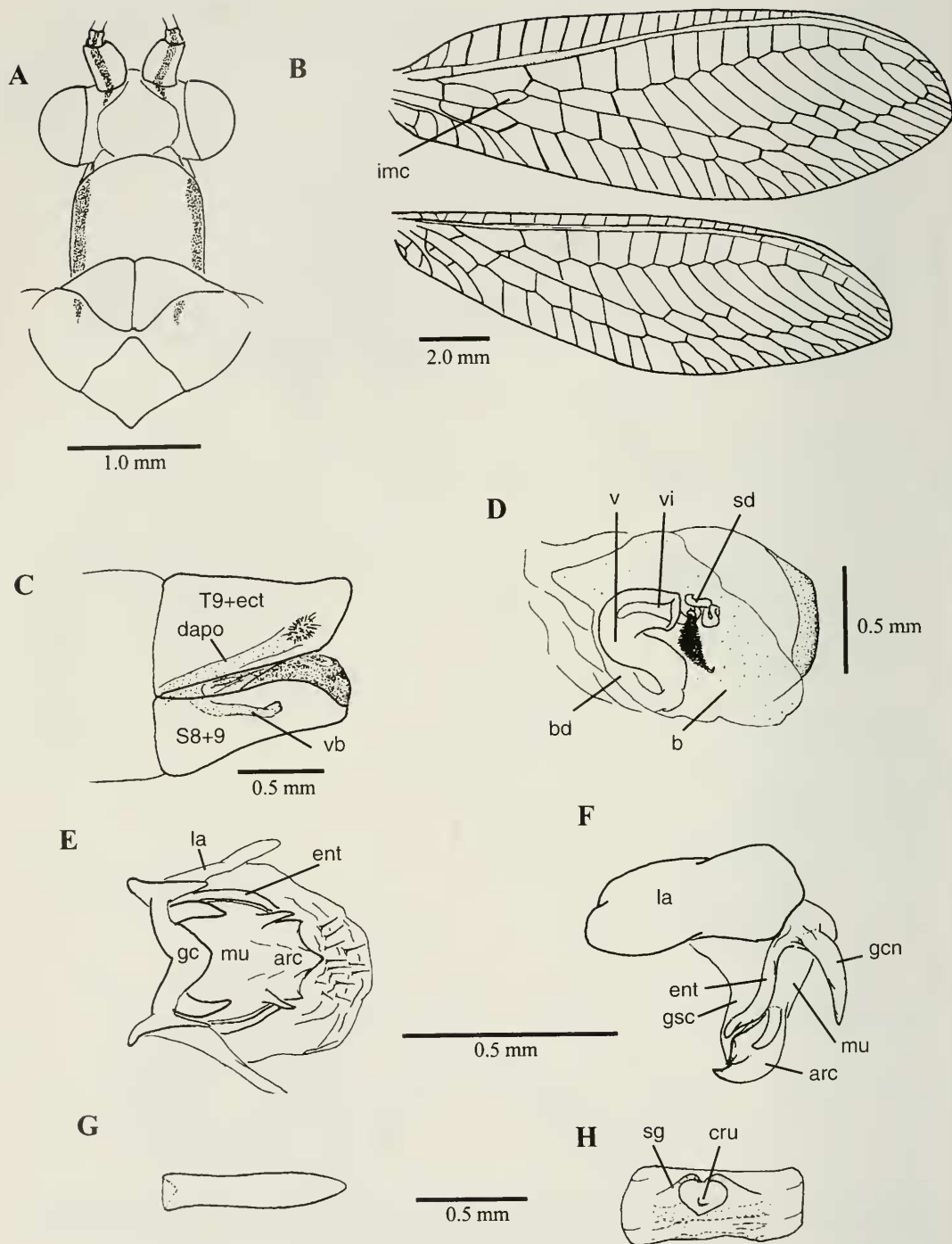


FIGURE 9. *Ceræochrysa caligata* (Banks, 1945). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen; D. Female genitalia; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Gonapsis; H. Subgenitale.

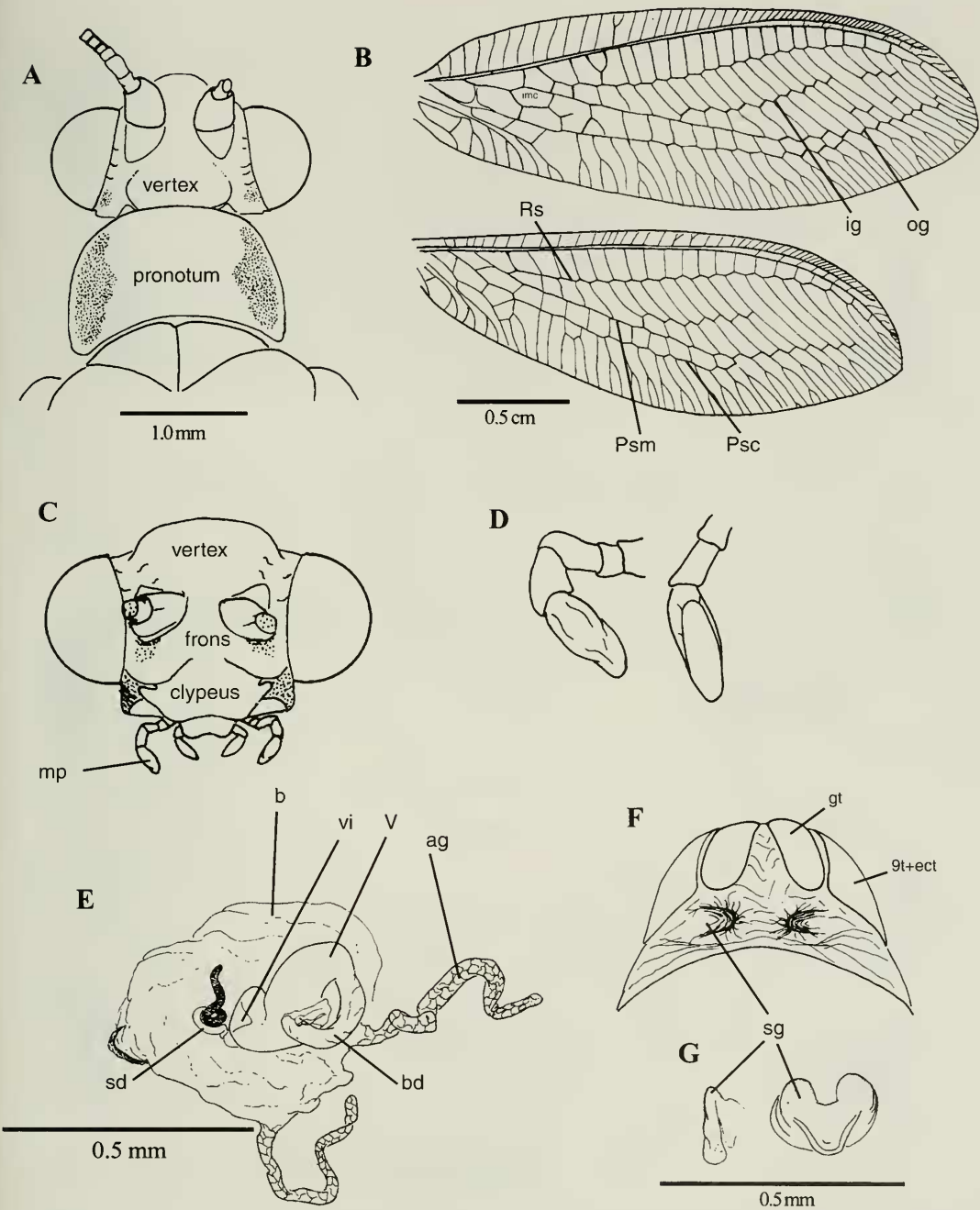


FIGURE 10. *Ceraeochrysa cincta* (Schneider, 1851). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Apex of female abdomen; E. Female genitalia; F. Gonapsis; G. Subgenitale; H. Male genitalia, lateral view; I. Male genitalia, dorsal view; da= dorsal apodeme of ectoproct, ent= entoprocessus, gps= gonapsis, vb= ventral branch of dorsal apodeme.

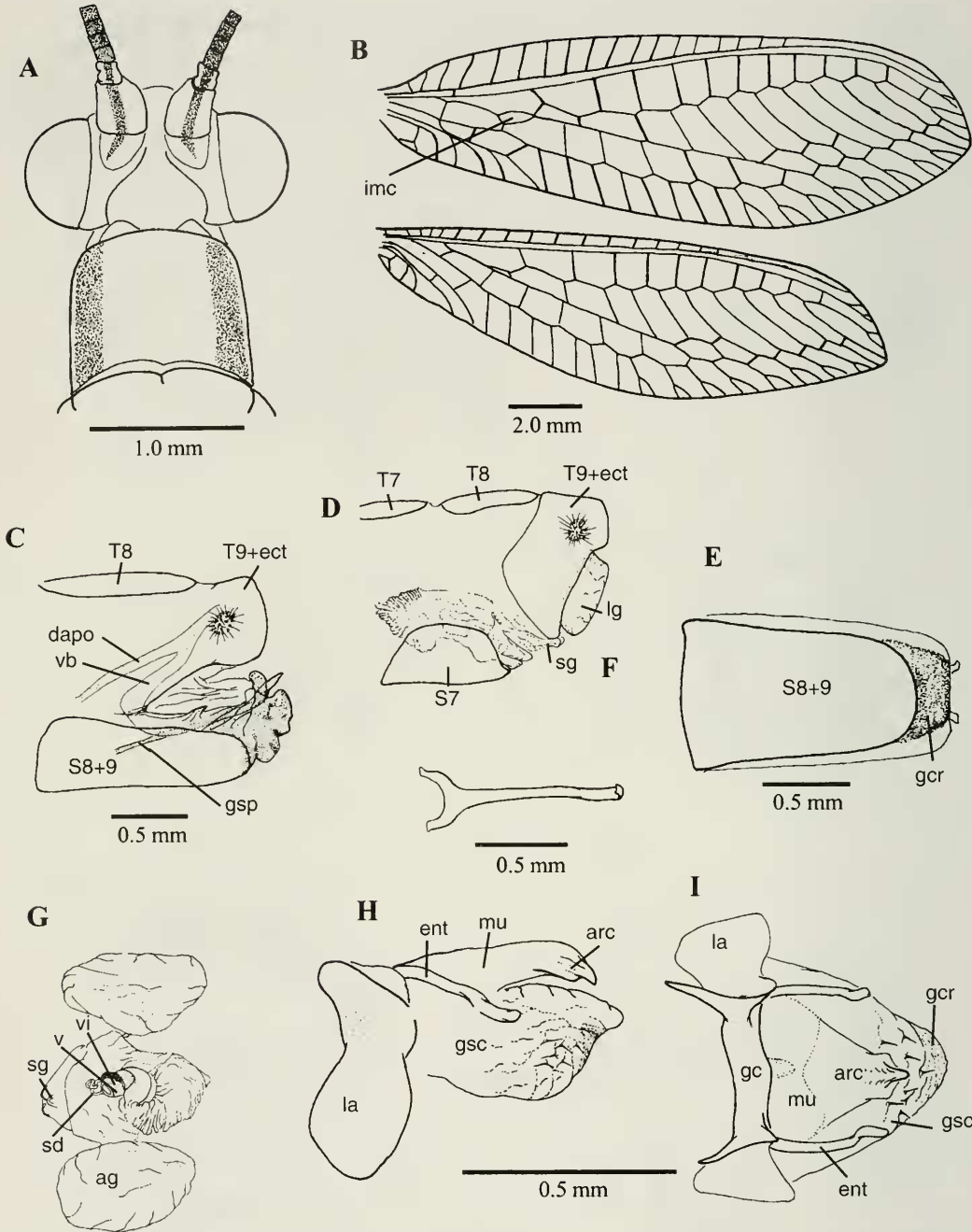


FIGURE 11. *Ceraeochrysa claveri* (Navás, 1911). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen; D. Apex of female abdomen; E. Sternite 8 + 9, ventral view; F. Gonapsis; G. Female genitalia; H. Male genitalia, lateral view; I. Male genitalia, dorsal view.

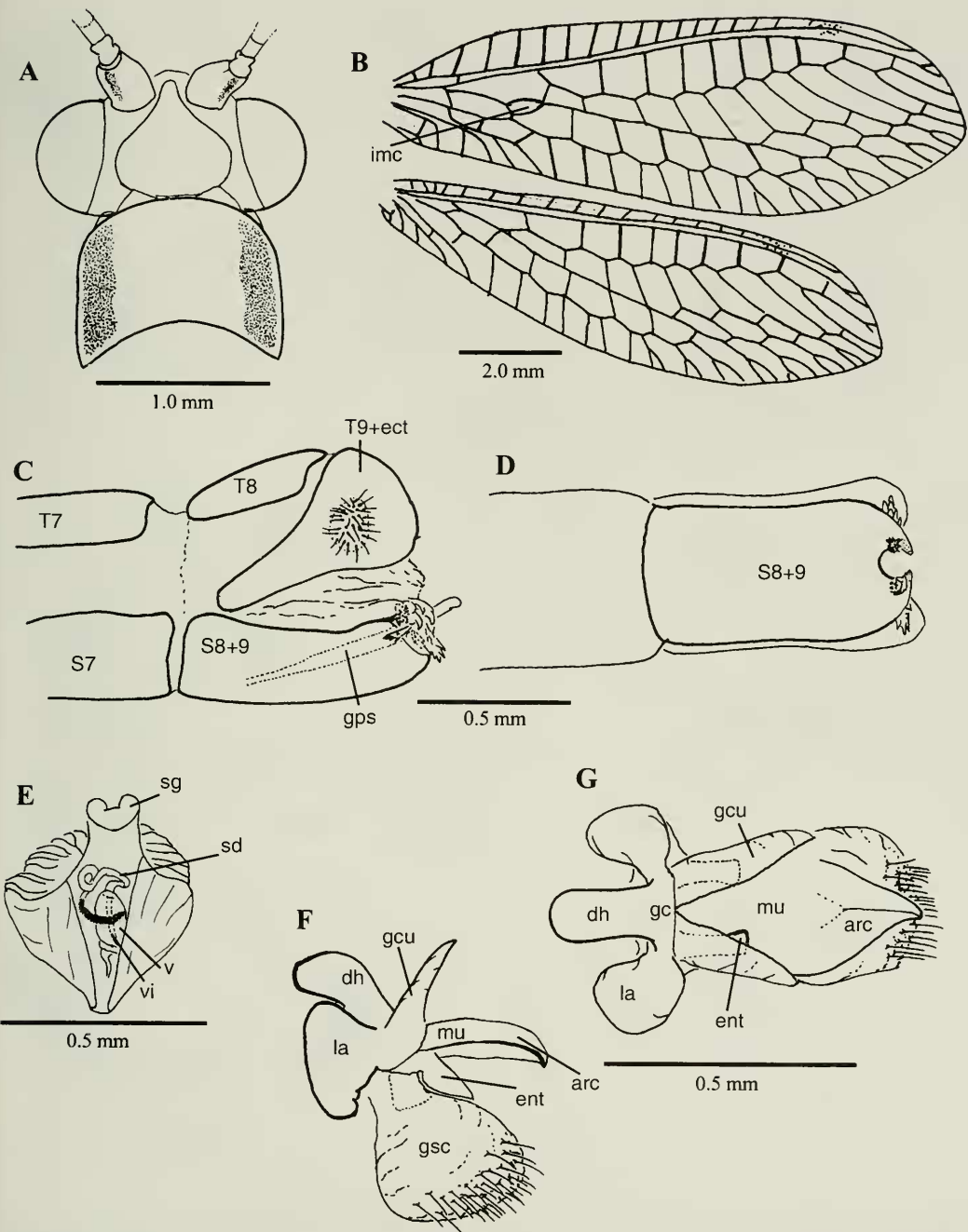


FIGURE 12. *Ceraeochrysa cubana* (Hagen, 1861). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Apex of male abdomen, ventral view; E. Female genitalia; F. Male genitalia, lateral view; G. Male genitalia, dorsal view.

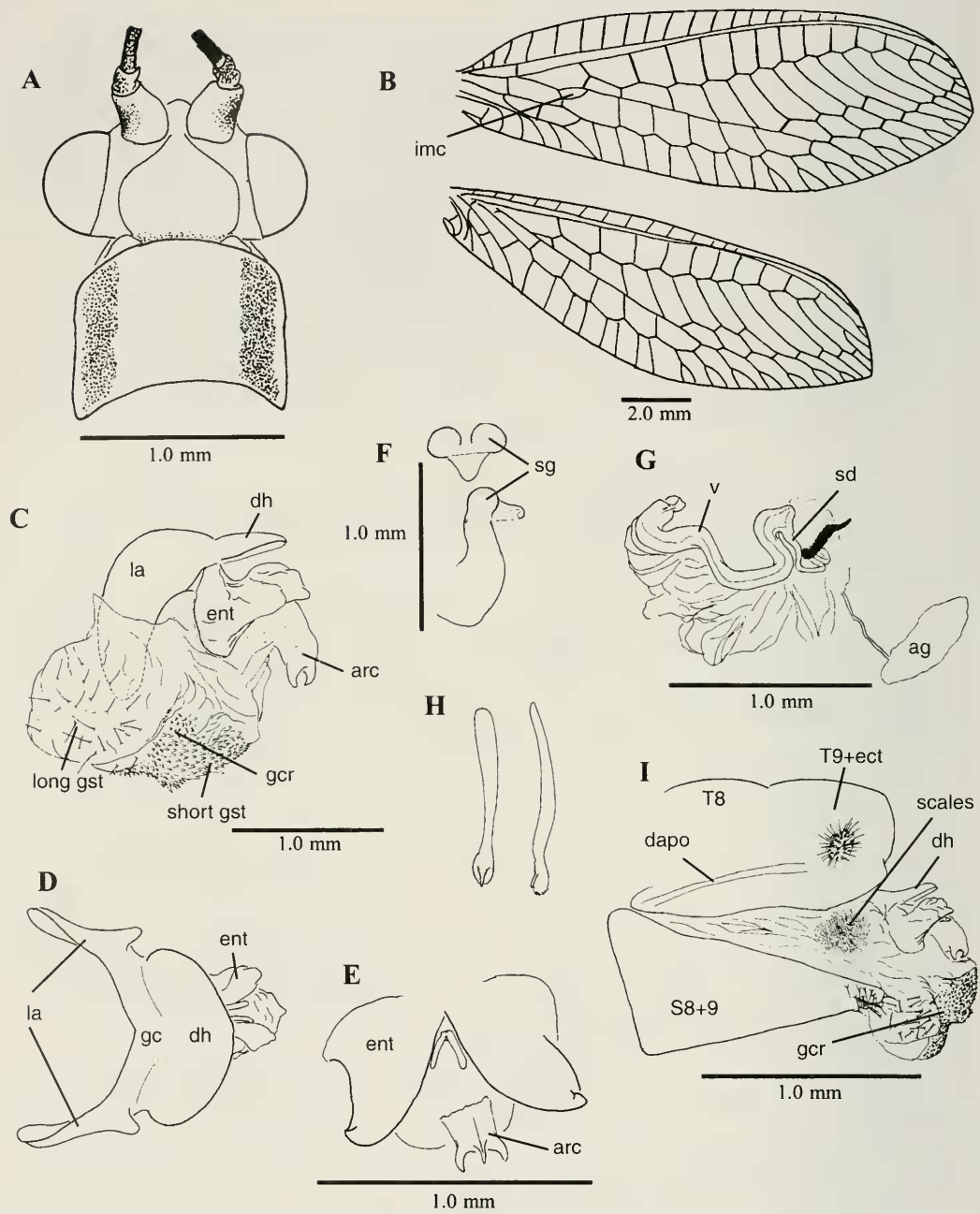


FIGURE 13. *Ceraeochrysa everes* (Banks, 1920). A. Head and prothorax, dorsal view; B. Wings; C. Male genitalia, lateral view; D. Male genitalia, dorsal view; E. Detail of apex of arcessus; F. Subgenitale; G. Spermatheca; H. Gonapsis; I. Apex of abdomen.

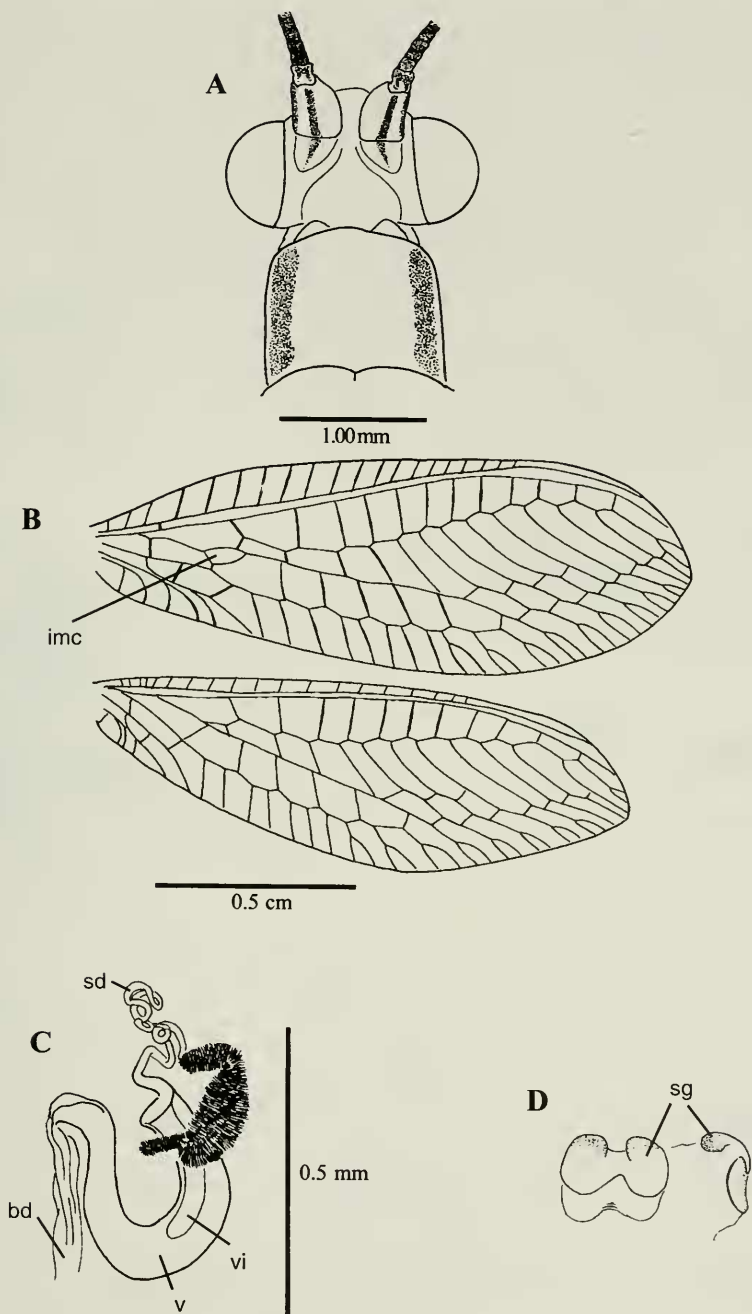


FIGURE 14. *Ceraeochrysa montoyana* (Navás, 1913). A. Head and prothorax, dorsal view; B. Wings; C. Spermatheca; D. Subgenitale.

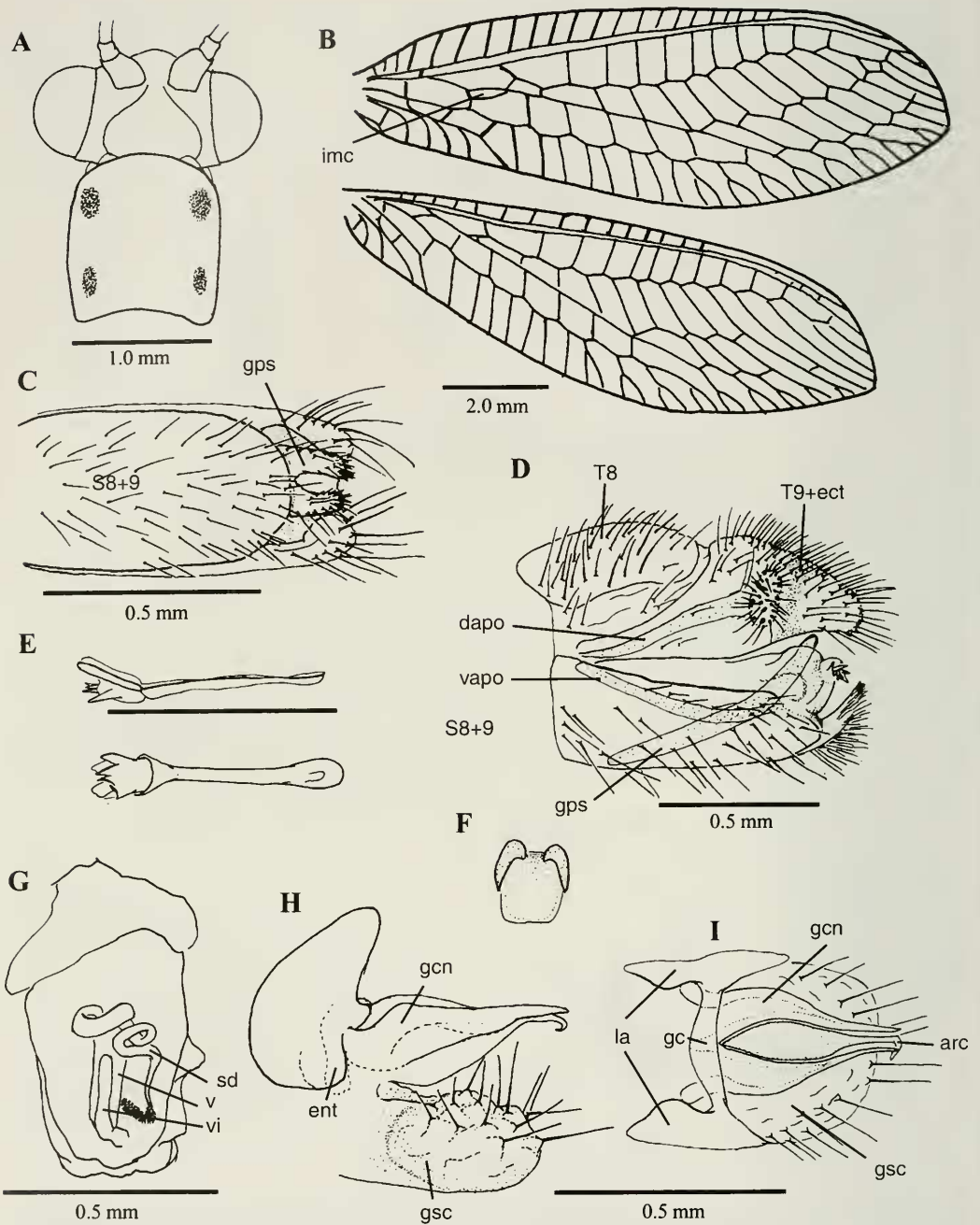


FIGURE 15. *Ceraeochrysa paraguayia* (Navás, 1919). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen, ventral view; D. Apex of male abdomen, lateral view; E. Gonapophysis; F. Subgenital; G. Female genitalia; H. Male genitalia, lateral view; I. Male genitalia, dorsal view.

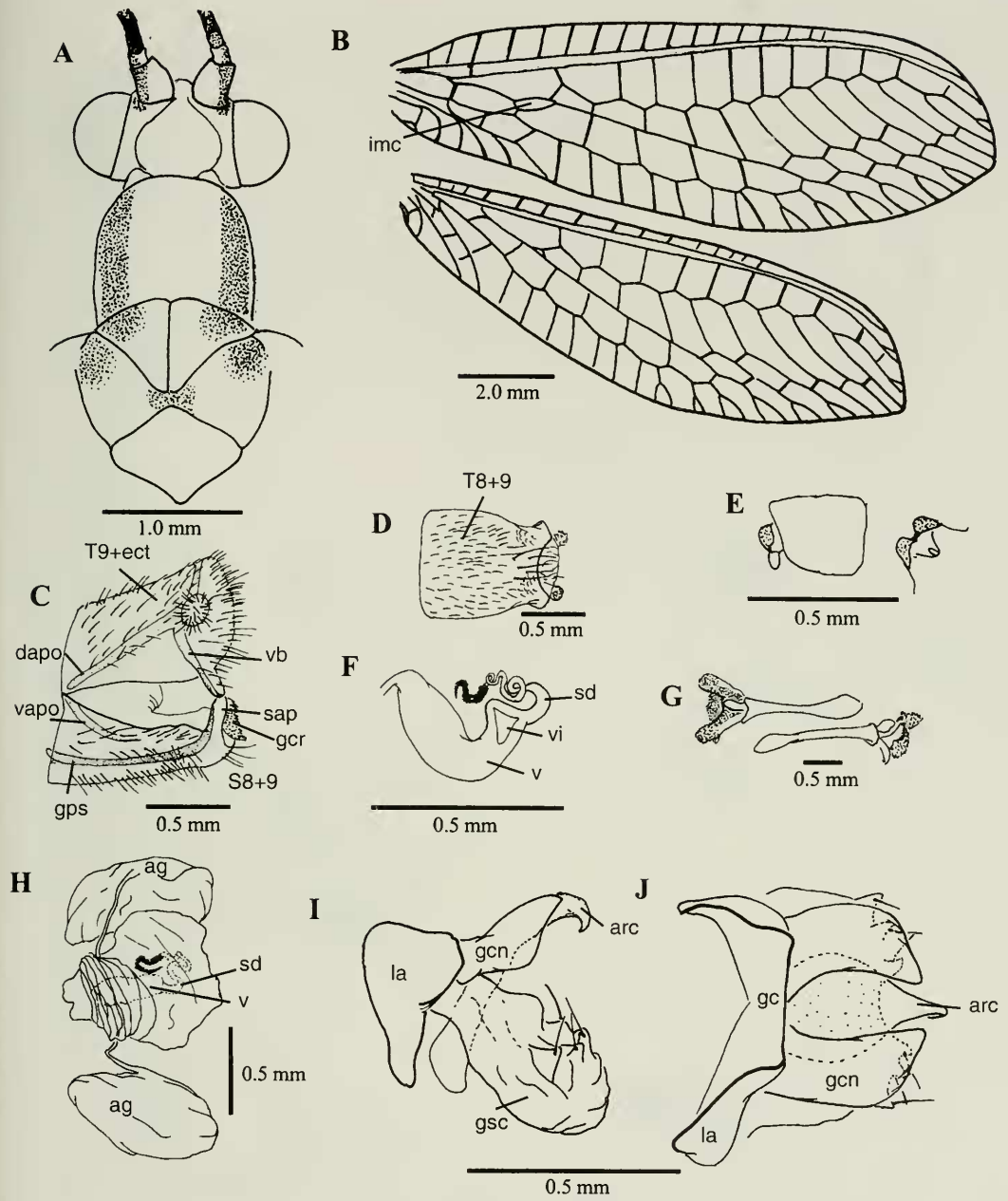


FIGURE 16. *Ceraeochrysa sanchezi* (Navás, 1924). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Sternite 8 + 9; E. Subgenital; F. Spermatheca; G. Gonapsis; H. Female genitalia; I. Male genitalia, lateral view; J. Male genitalia, dorsal view.

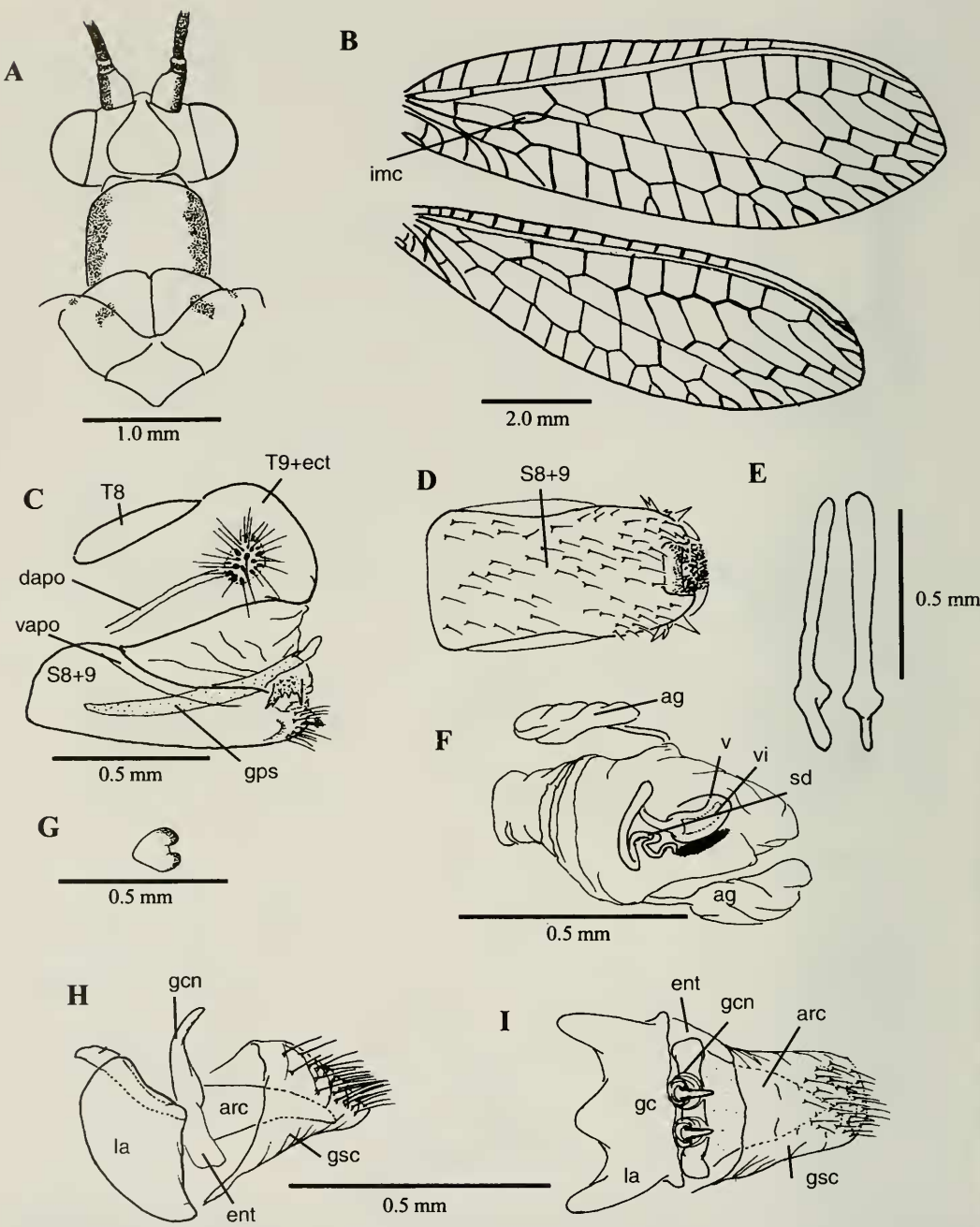


FIGURE 17. *Ceraeochrysa scapularis* (Navás, 1914). A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Sternite 8 + 9; E. Gonapsis; F. Female genitalia; G. Subgenitale; H. Male genitalia, lateral view; I. Male genitalia, dorsal view.

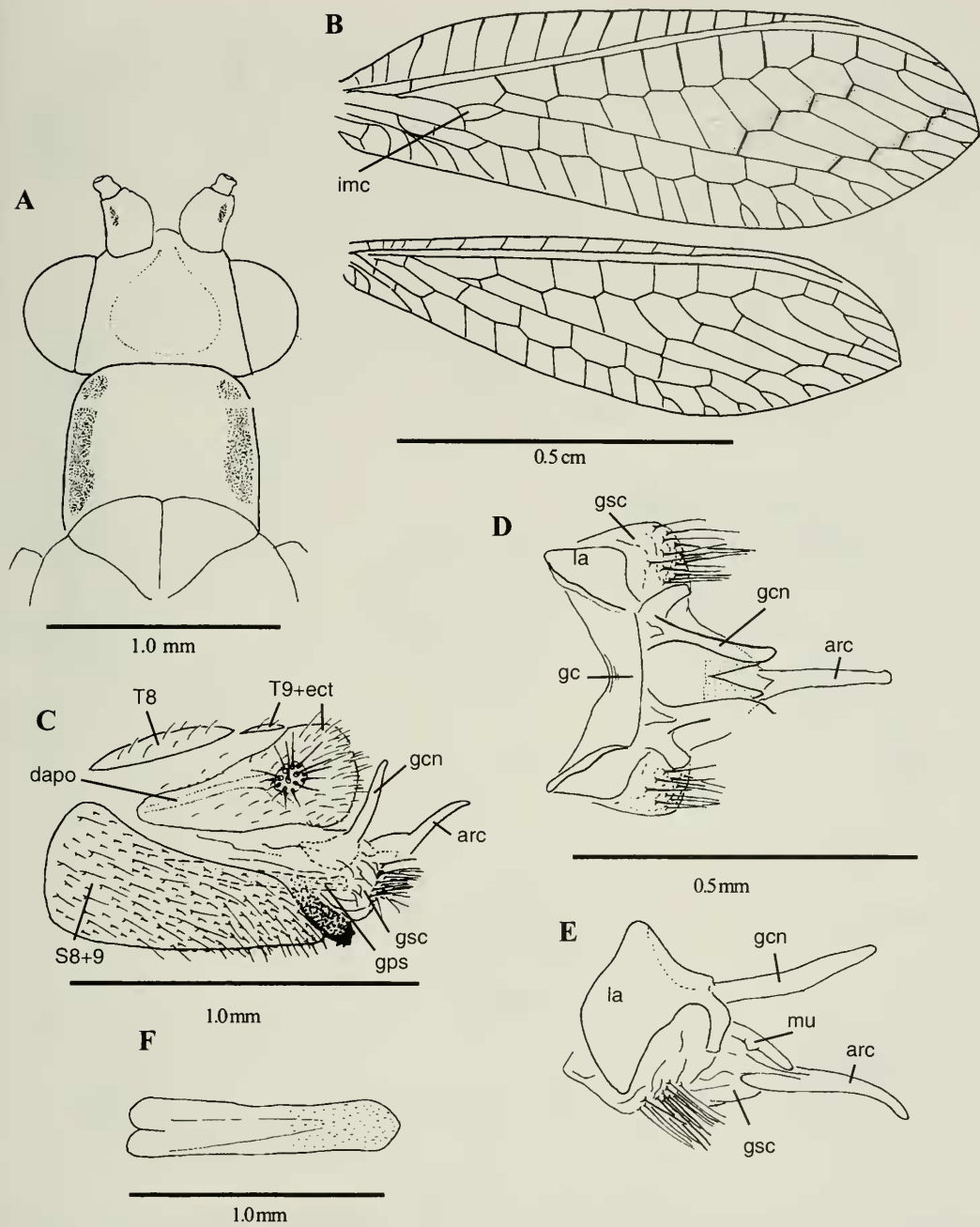


FIGURE 18. *Ceraeochrysa tenuicornis* Adams and Penny, 1987. A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view; F. Gonapsis.

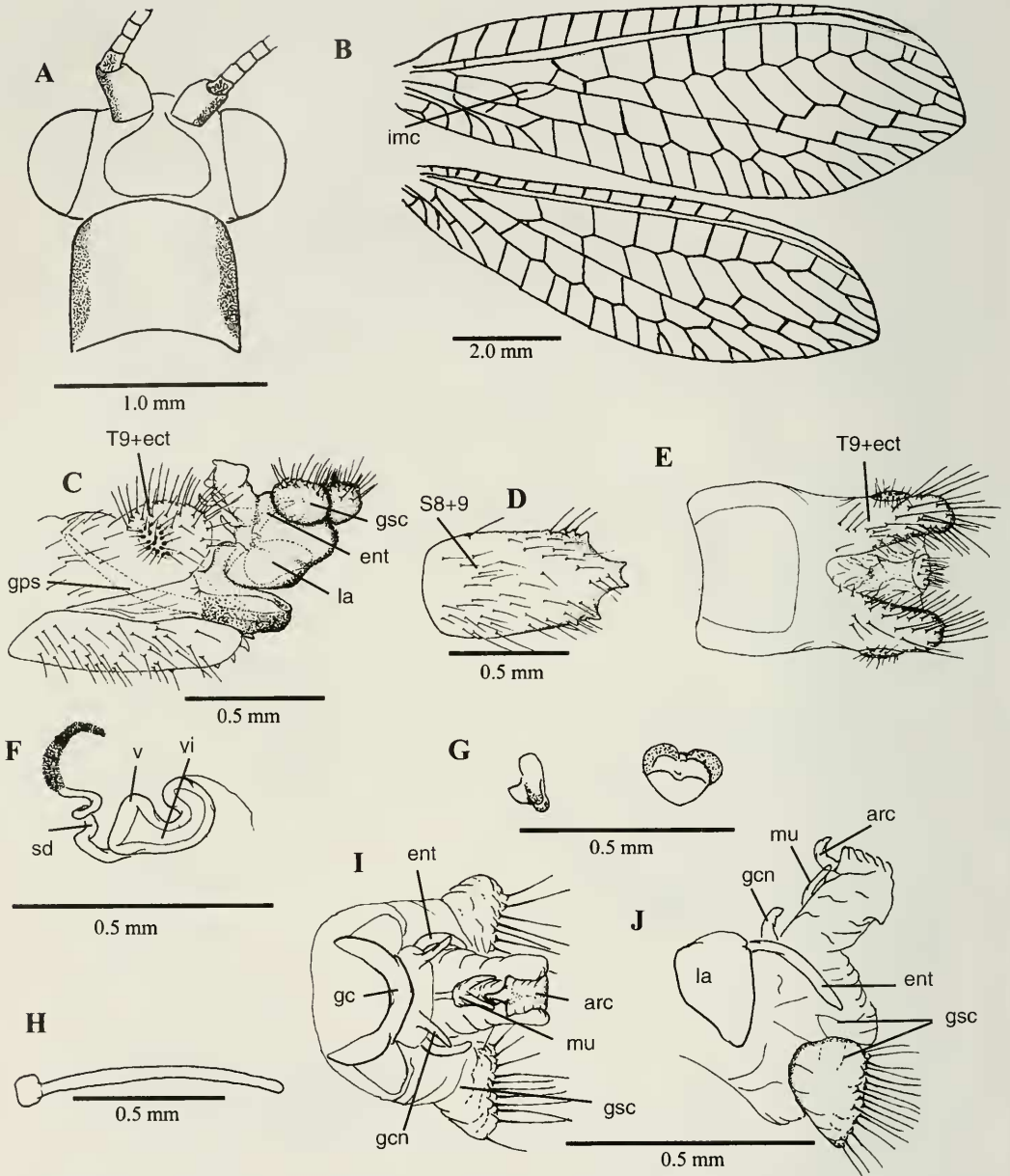


FIGURE 19. *Ceraeochrysa tucumana* (Navás, 1919). A. Head and prothorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Sternite 8 + 9; E. Apex of male abdomen, dorsal view; F. Spermatheca; G. Subgenitale; H. Gonapsis; I. Male genitalia, dorsal view; J. Male genitalia, lateral view.

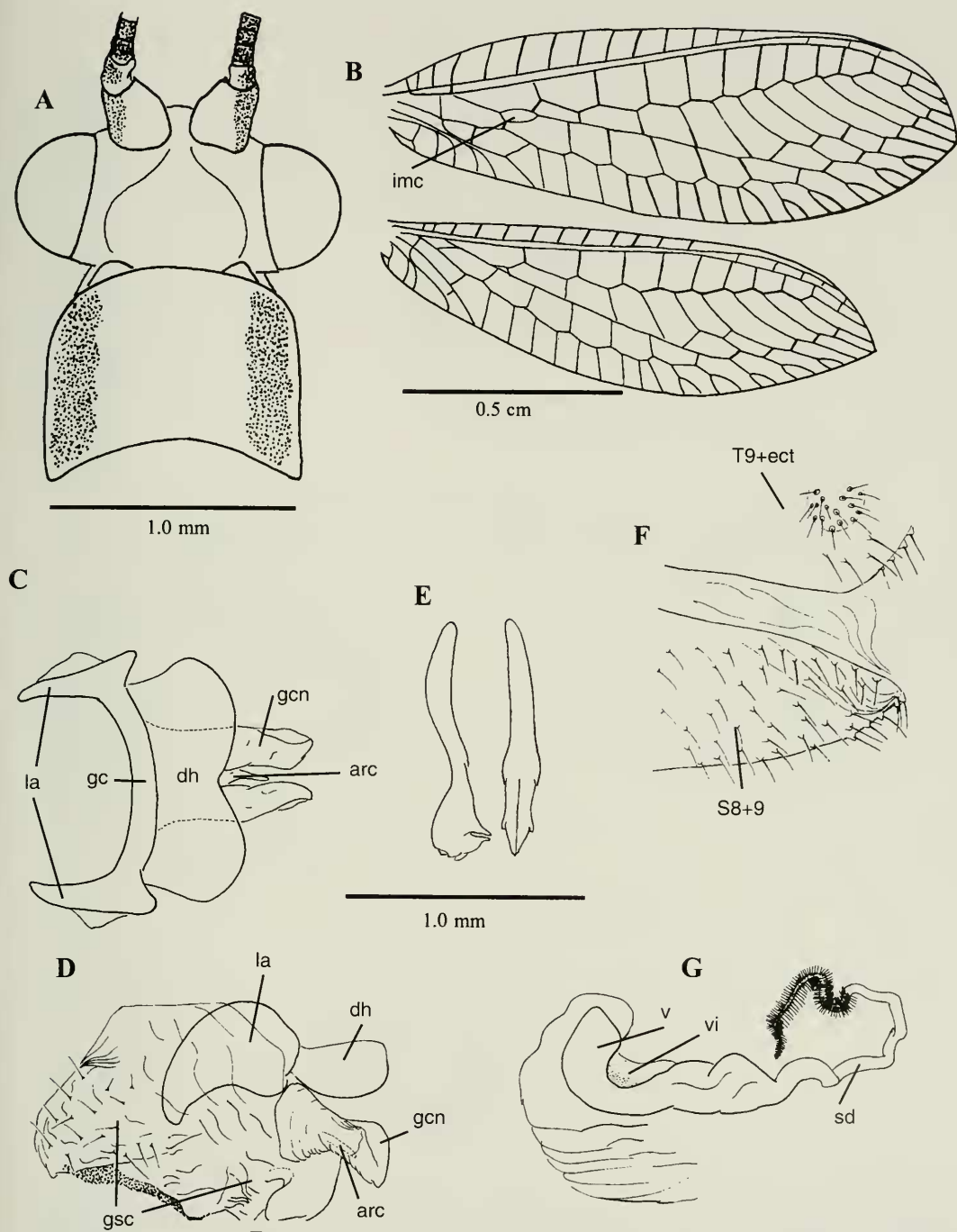


FIGURE 20. *Ceraeochrysa dislepis*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Male genitalia, dorsal view; D. Male genitalia, lateral view; E. Gonapsis; F. Apex of male abdomen, detail; G. Spermatheca.

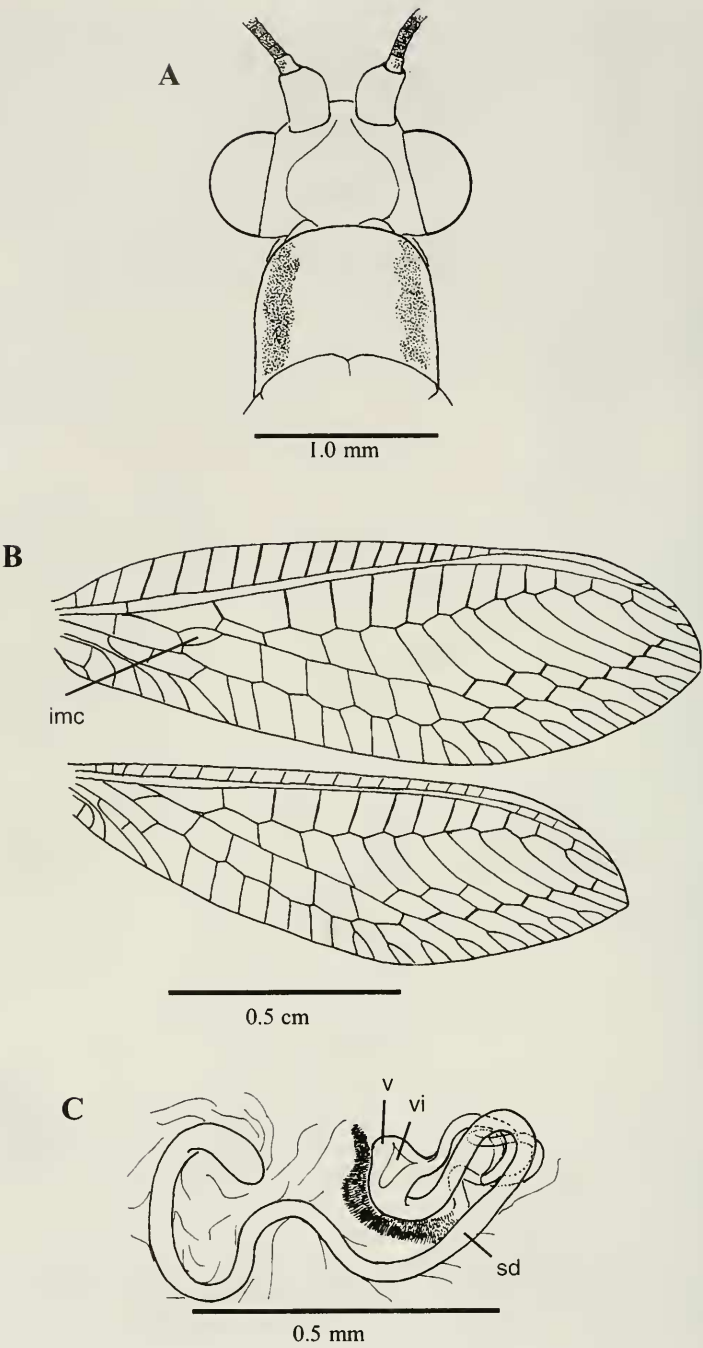


FIGURE 21. *Ceraeochrysa dolichosvela*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Female genitalia.

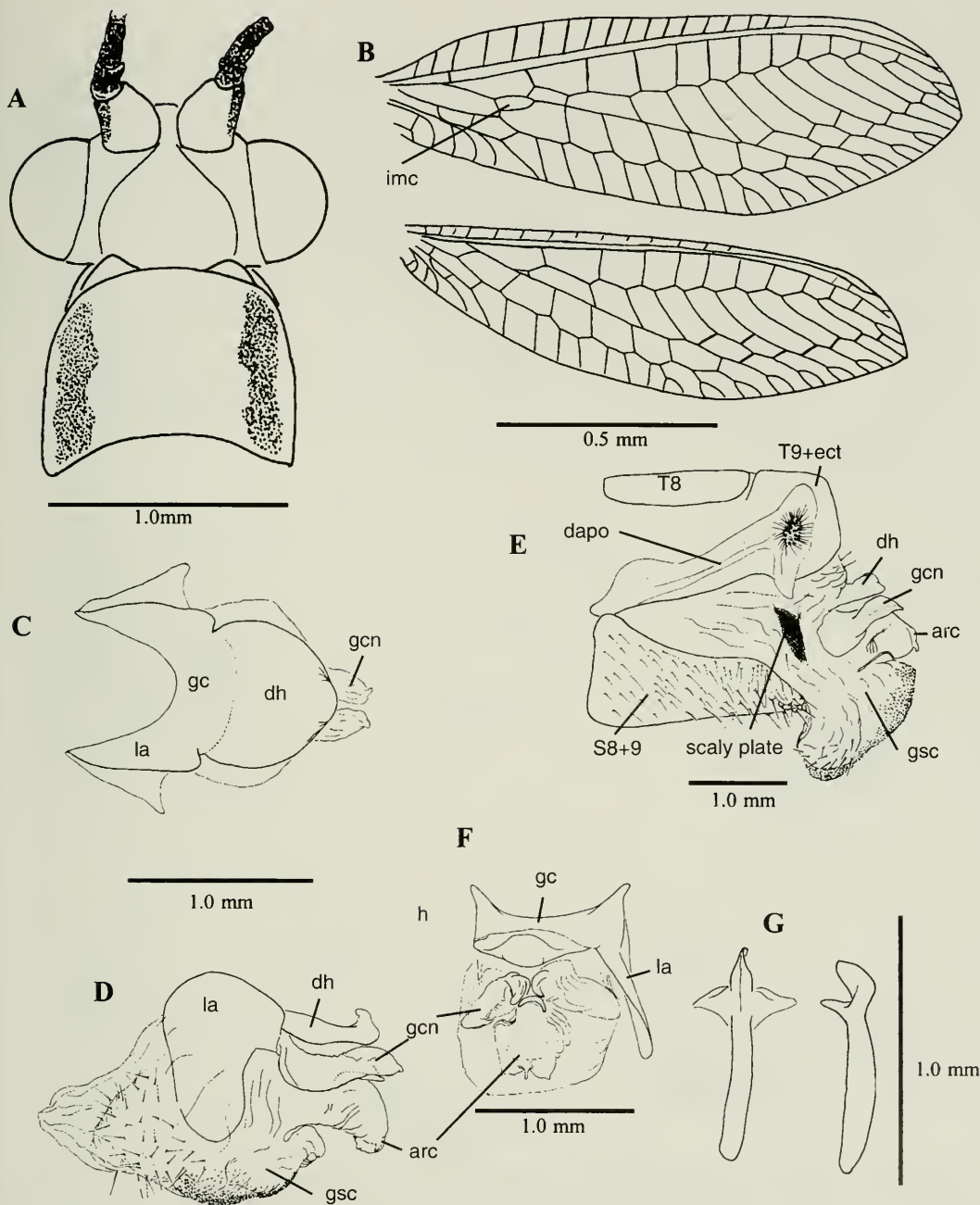


FIGURE 22. *Ceraeochrysa squama*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Male genitalia, dorsal view; D. Male genitalia, lateral view; E. Apex of male abdomen apex, lateral view; F. Male genitalia, caudal view; G. Gonapsis.

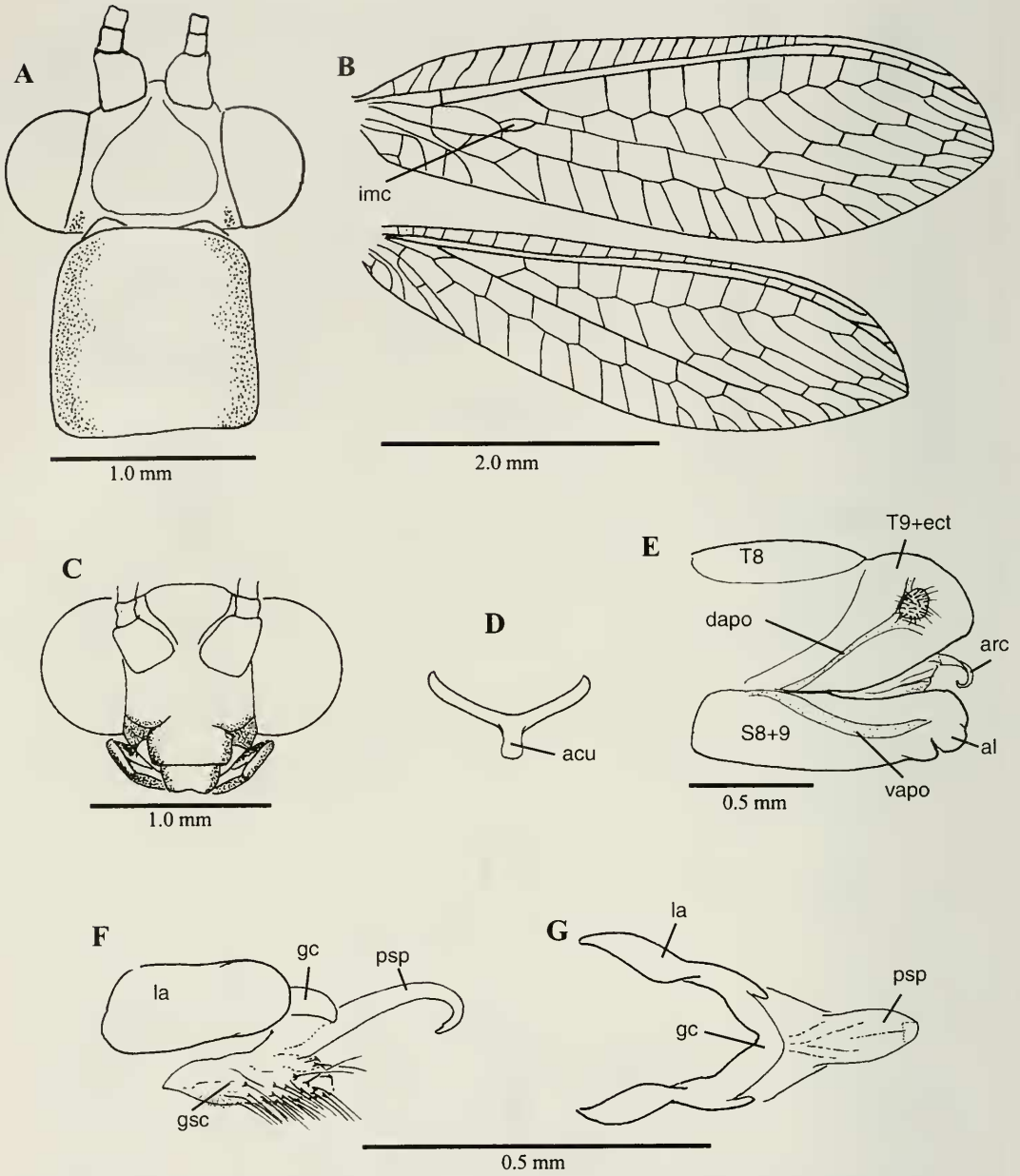


FIGURE 23. *Chrysoperla defreitasi* Brooks, 1994. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Tignum; E. Apex of male abdomen; F. Male genitalia, lateral view; G. Male genitalia, dorsal view.

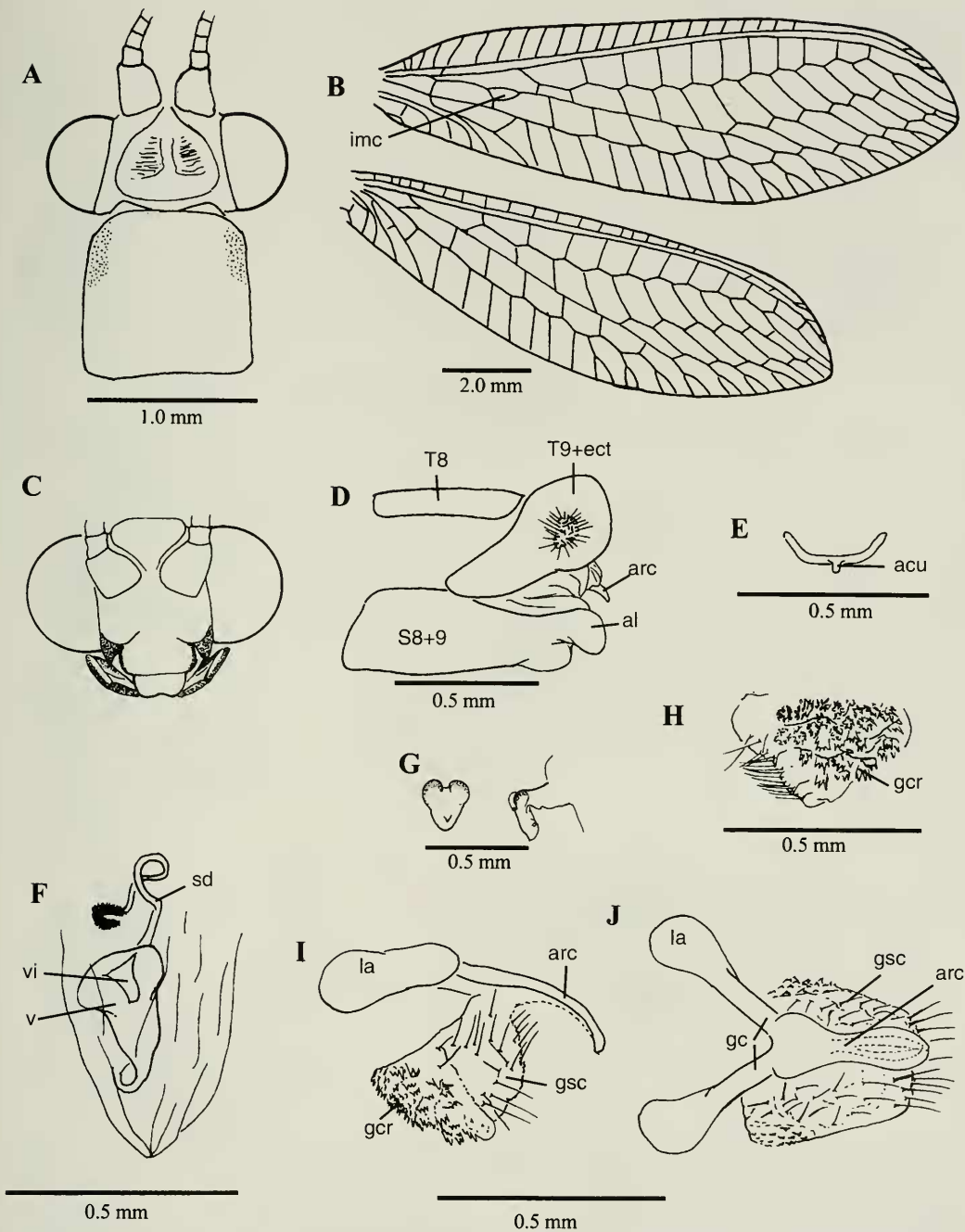


FIGURE 24. *Chrysoperla externa* (Hagen, 1861). A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen, lateral view; E. Tignum; F. Female genitalia; G. Subgentiale; H. Gonosaccus; I. Male genitalia, lateral view; J. Male genitalia, dorsal view.

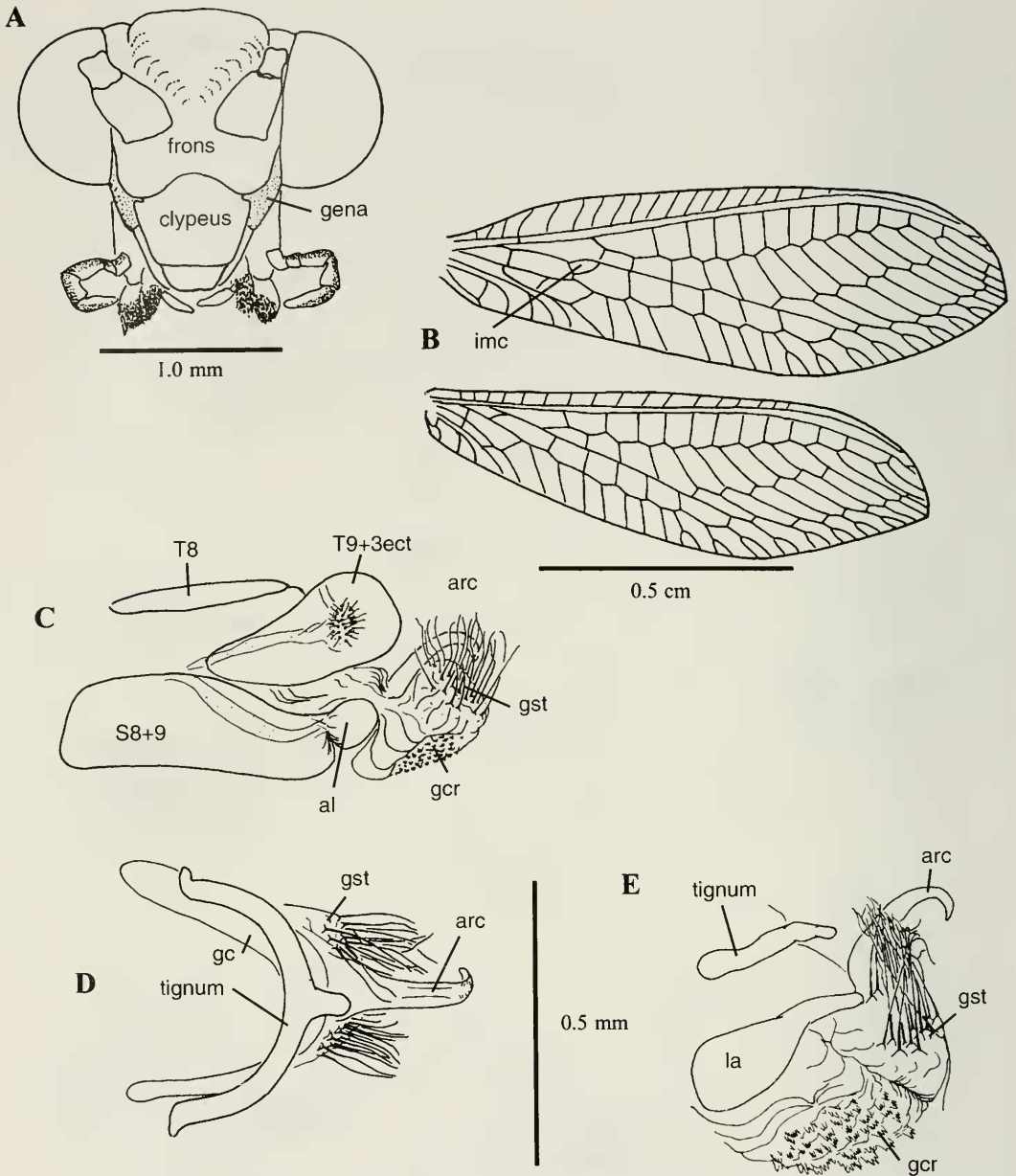


FIGURE 25. *Chrysoperla raimundoi*, new species. A. Head, frontal view; B. Wings; C. Apex of male abdomen; D. Male genitalia, dorsal view; E. Male genitalia, lateral view.

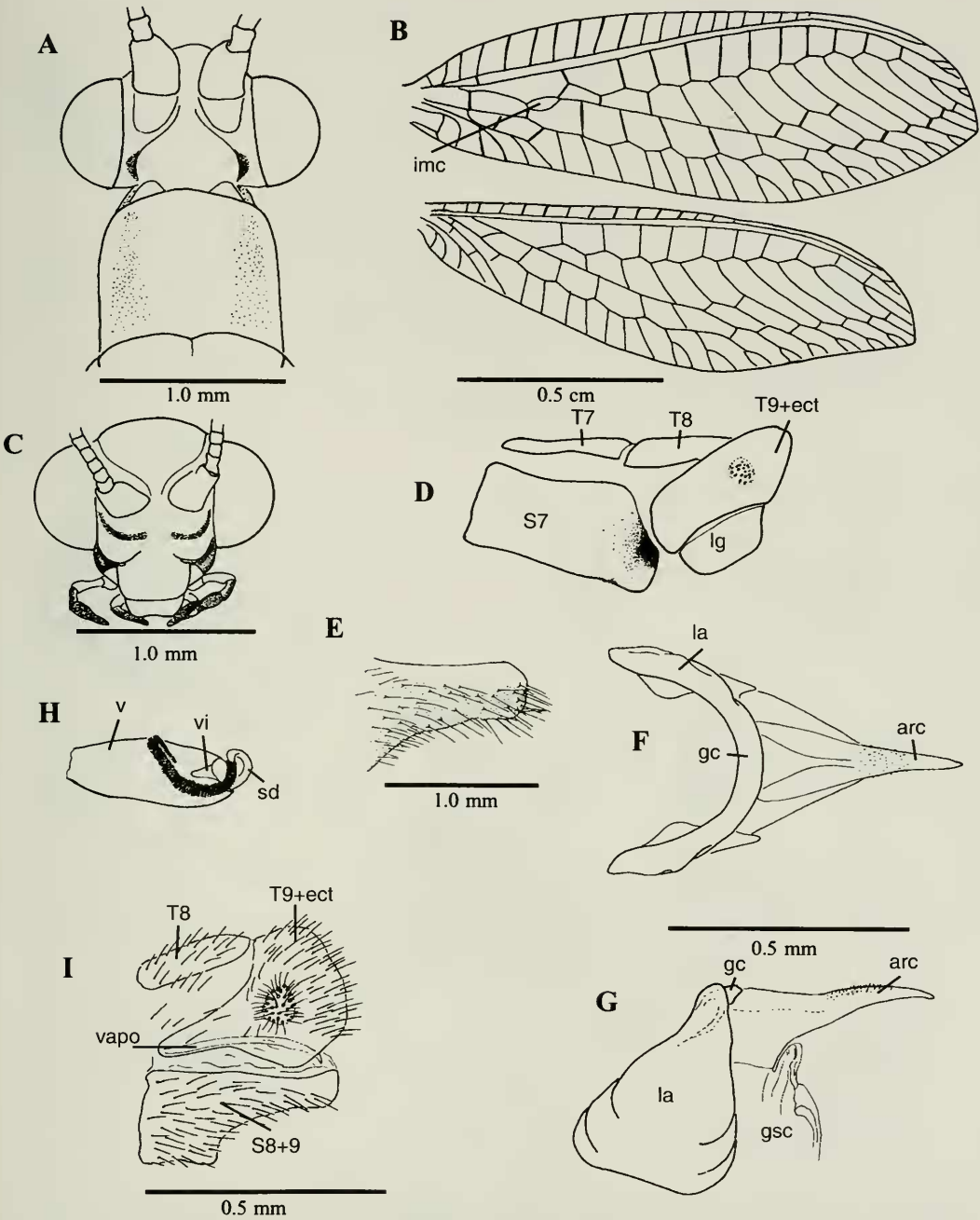


FIGURE 26. *Chrysopodes (Chrysopodes) lineafrons* Adams and Penny, 1987. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of female abdomen, lateral view; E. Male sternite 8 + 9 apex; F. Male genitalia, dorsal view; G. Male genitalia, lateral view; H. Spermatheca; I. Apex of male abdomen, lateral view.

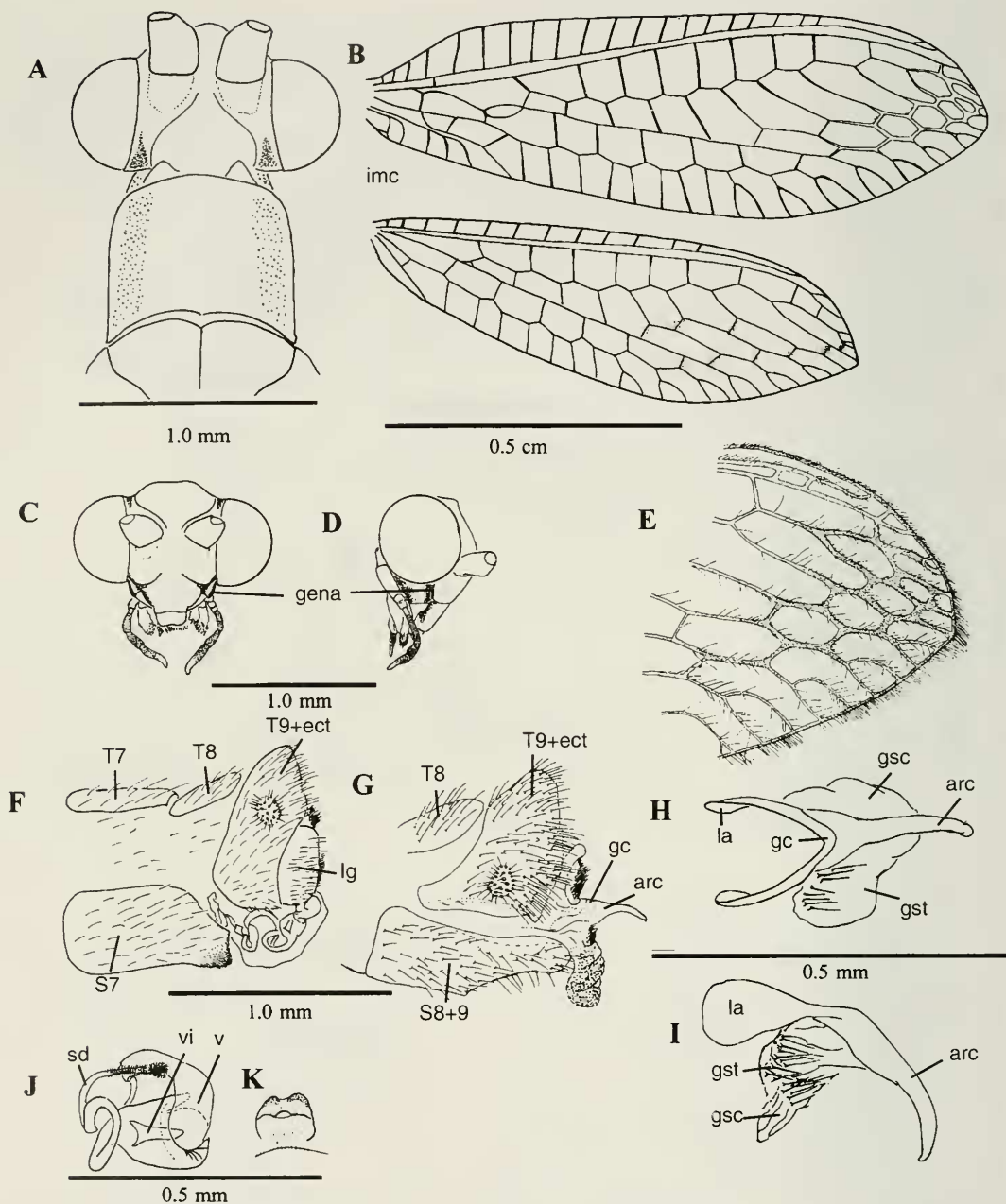


FIGURE 27. *Chrysopodes (Chrysopodes) polygonica* Adams and Penny, 1987. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Head, lateral view; E. Apex of forewing; F. Apex of female abdomen, lateral view; G. Apex of male abdomen, lateral view; H. Male genitalia, dorsal view; I. Male genitalia, lateral view; J. Female genitalia; K. Subgenitale.

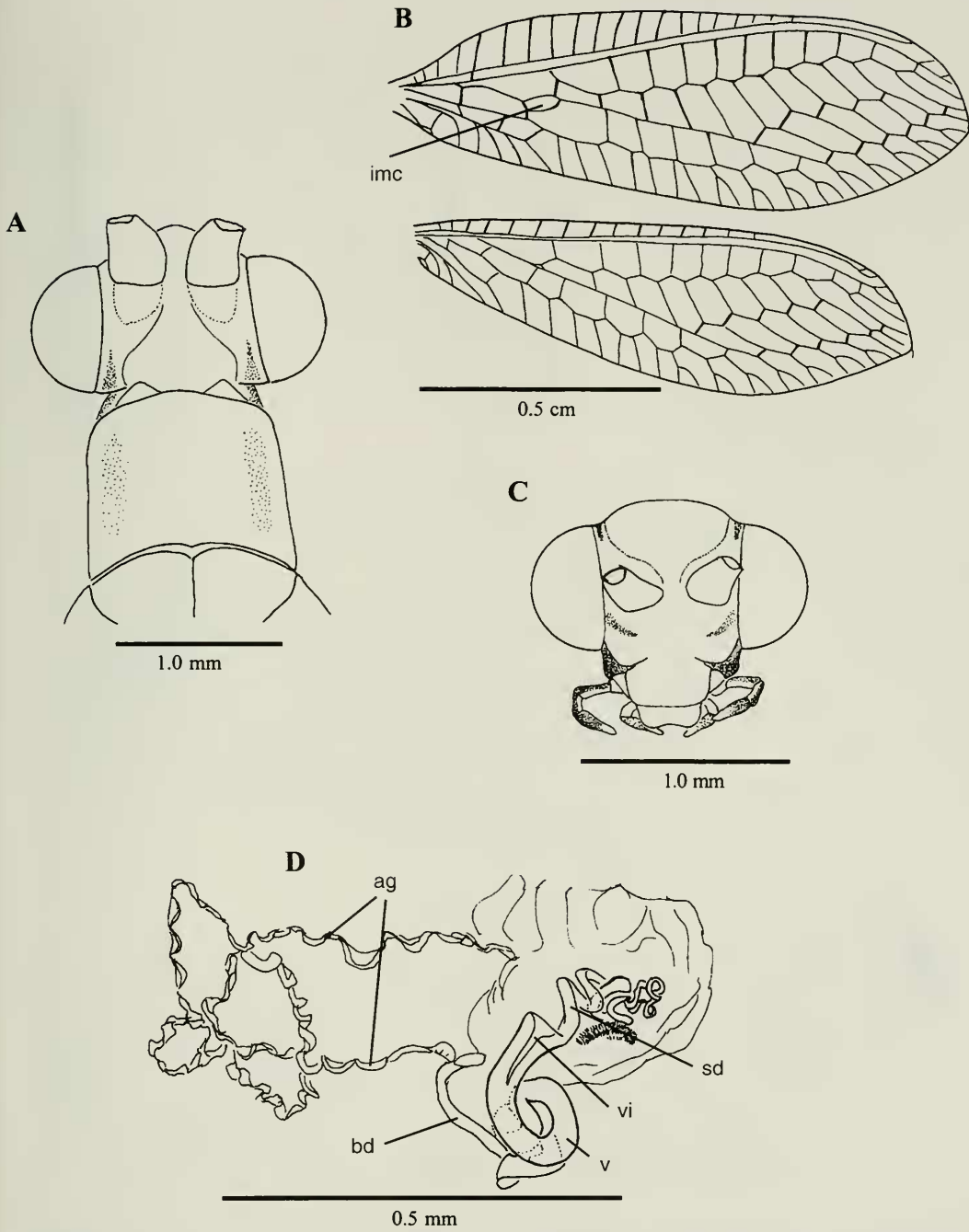


FIGURE 28. *Chrysopodes (Chrysopodes) spinella* Adams and Penny, 1987. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Female genitalia.

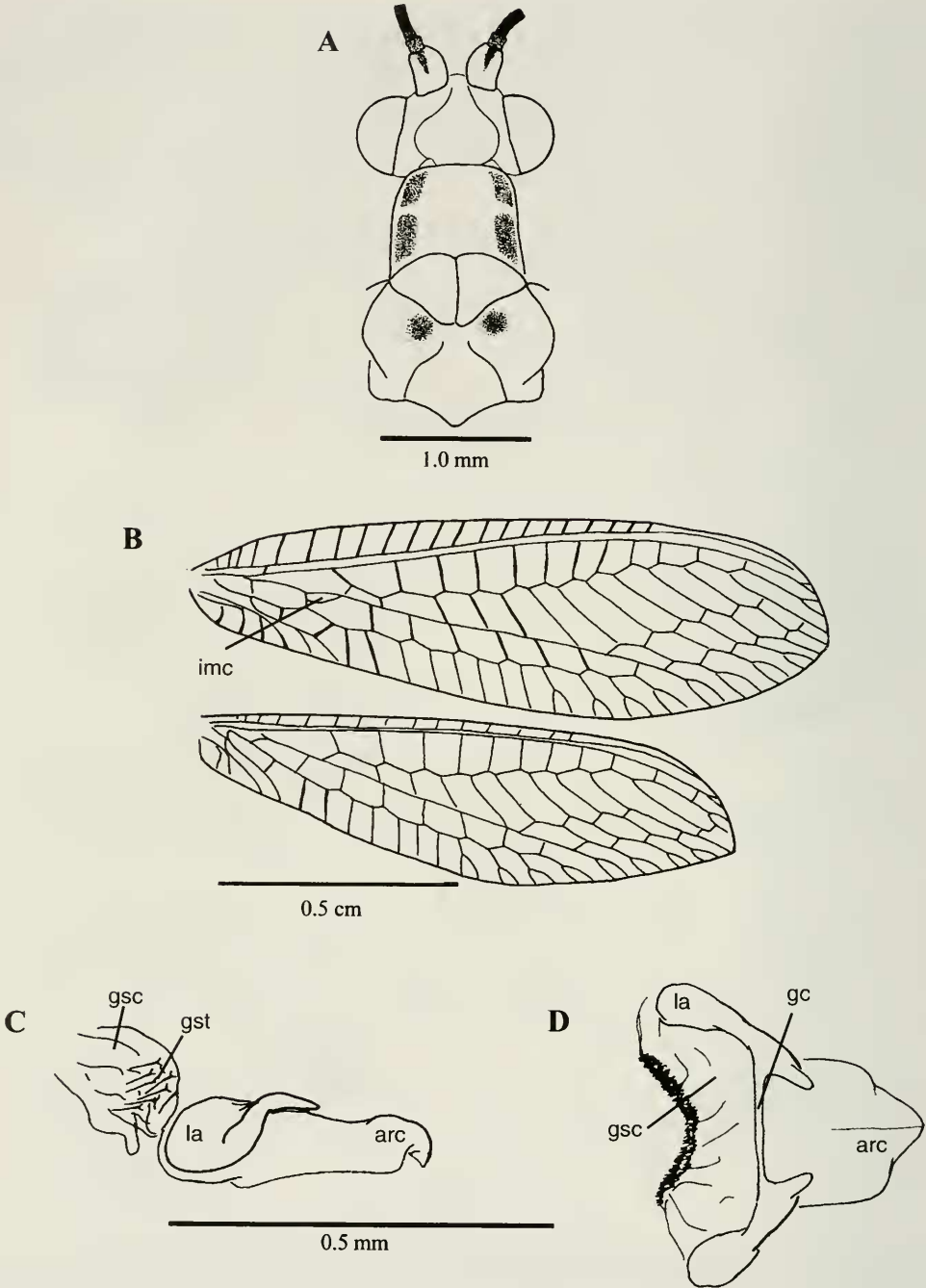


FIGURE 29. *Chrysopodes (Chrysopodes) adynatos*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Male genitalia, lateral view; D. Male genitalia, dorsal view.

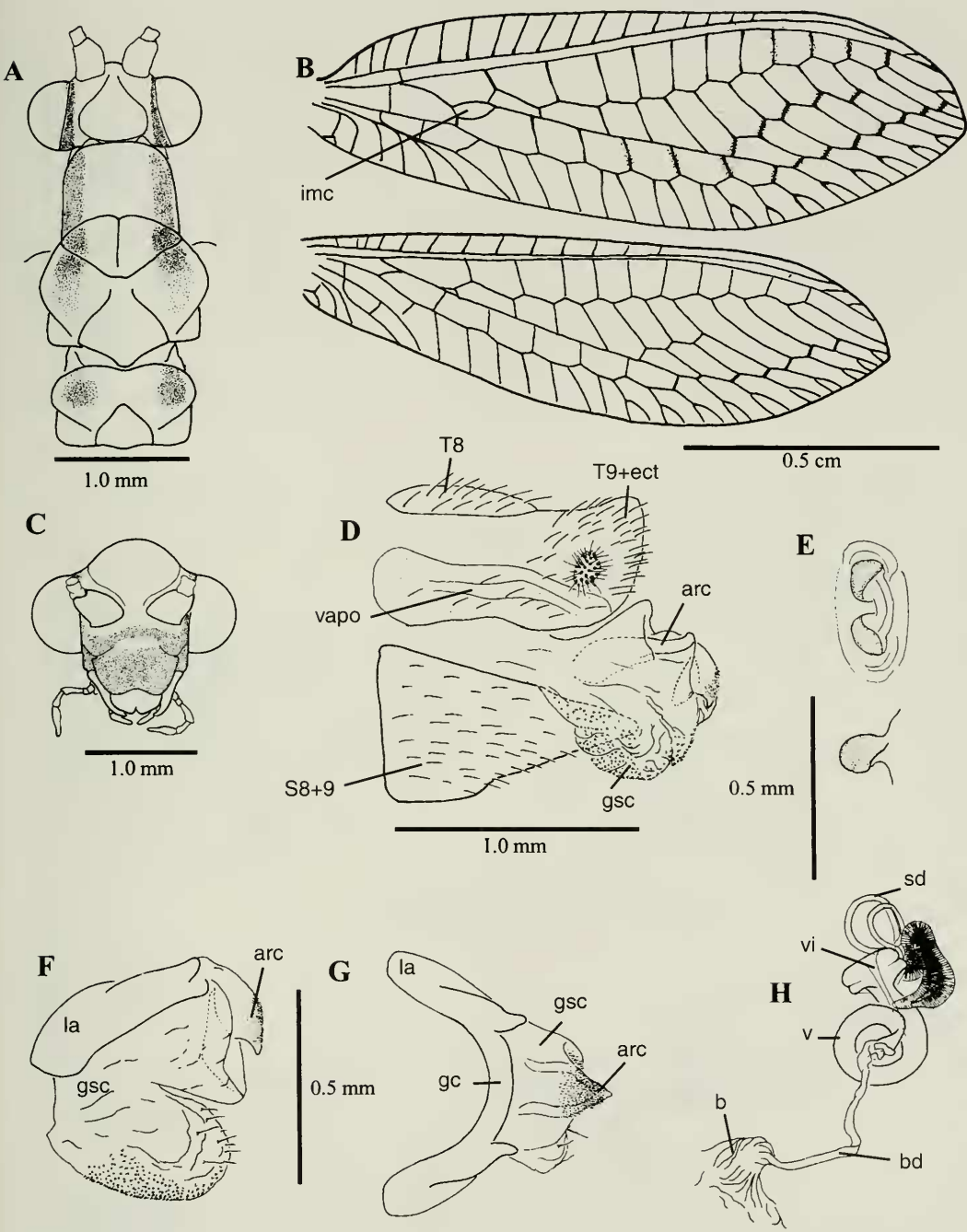


FIGURE 30. *Chrysopodes (Chrysopodes) copia*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen, lateral view; E. Subgenitale; F. Male genitalia, lateral view; G. Male genitalia, dorsal view; H. Spermatheca.

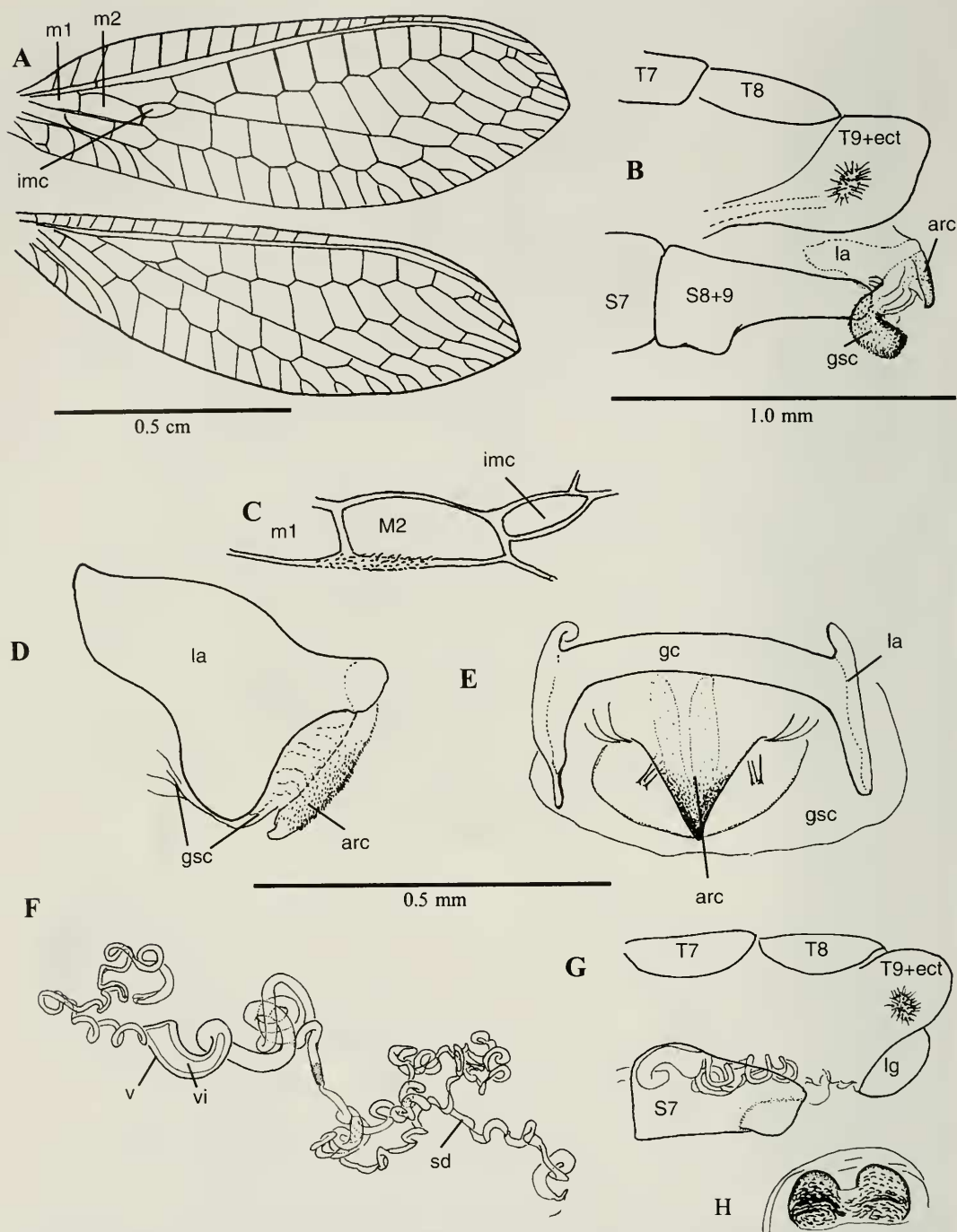


FIGURE 31. *Chrysopodes (Chrysopodes) crocinus*, new species. A. Wings; B. Apex of male abdomen, lateral view; C. Encrassate median cell; D. Male genitalia, lateral view; E. Male genitalia, dorsal view; F. Spermatheca; G. Apex of female abdomen, lateral view; H. Subgenitale.

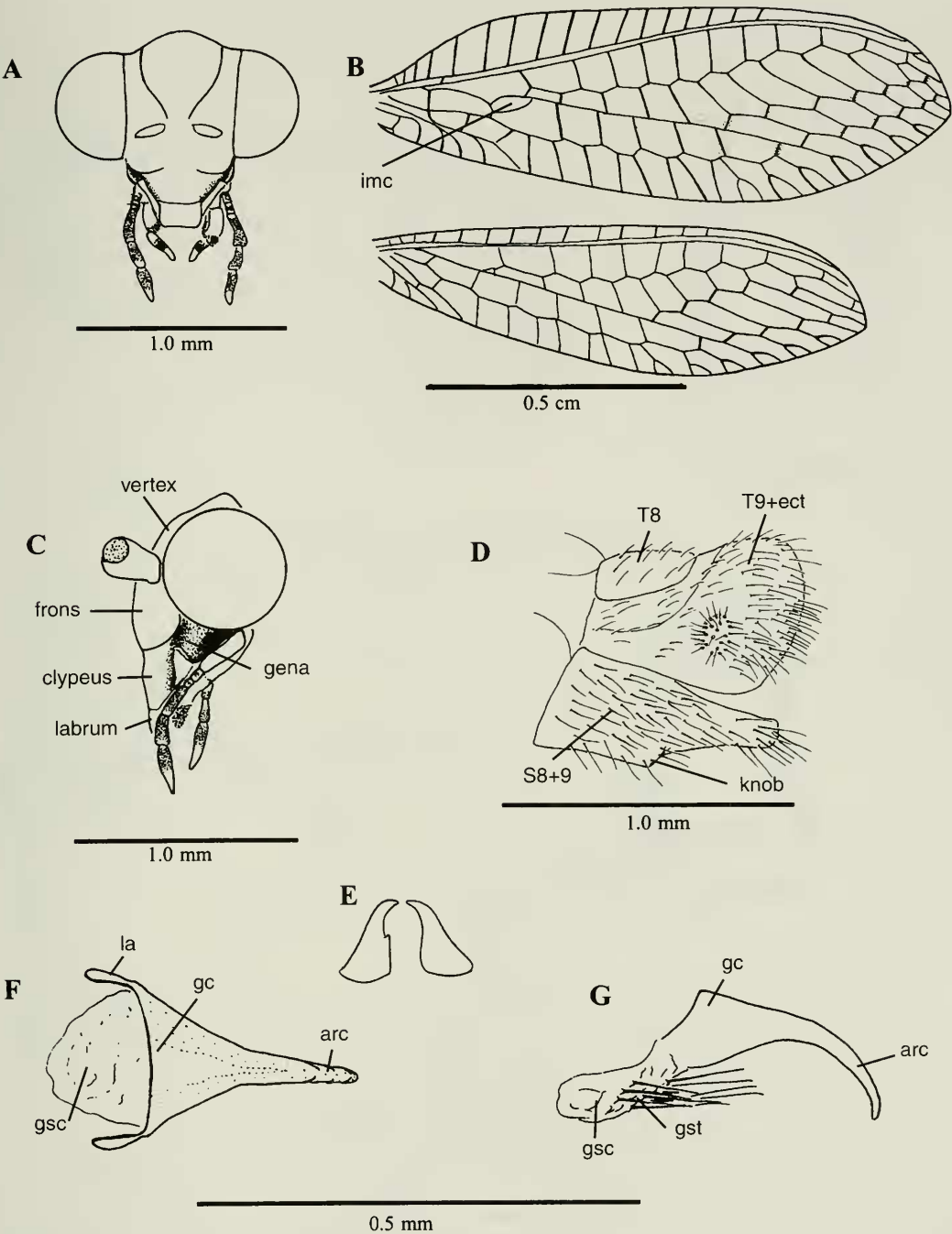


FIGURE 32. *Chrysopodes (Chrysopodes) delicata*, new species. A. Head, frontal view; B. Wings; C. Head, lateral view; D. Apex of male abdomen, lateral view; E. Mandibles; F. Male genitalia, dorsal view; G. Male genitalia, lateral view.

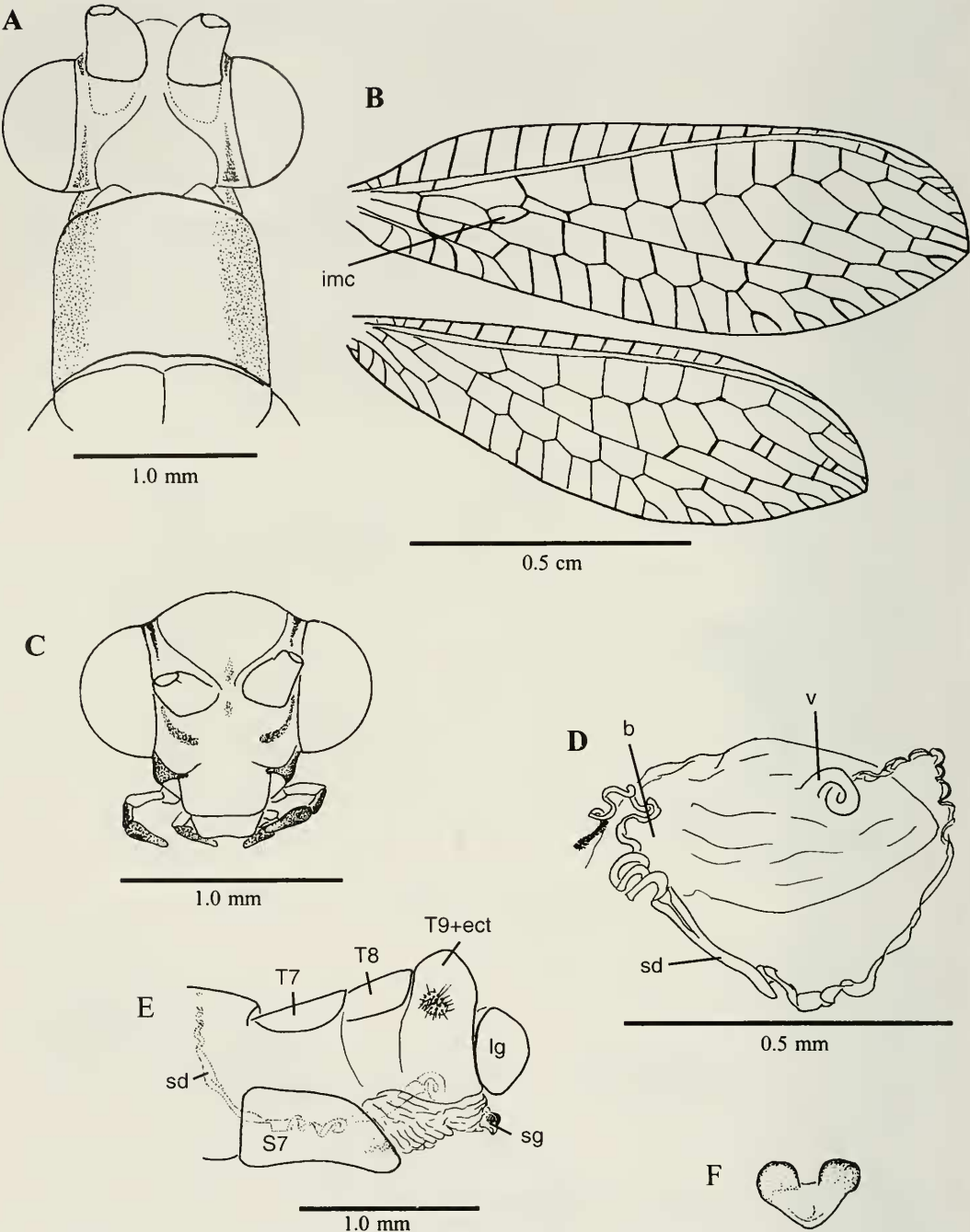


FIGURE 33. *Chrysopodes (Chrysopodes) elongata*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Female genitalia; E. Apex of female abdomen; F. Subgenitale.

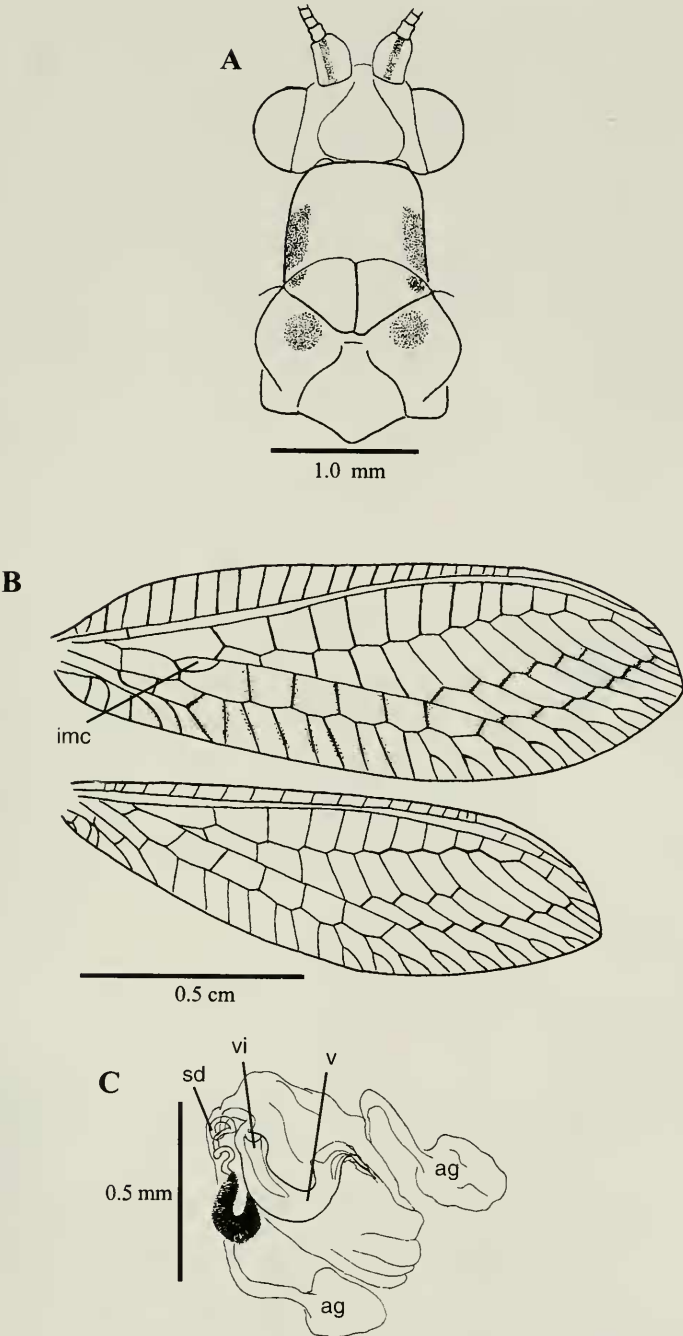


FIGURE 34. *Chrysopodes (Chrysopodes) nigropicta*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Female genitalia.

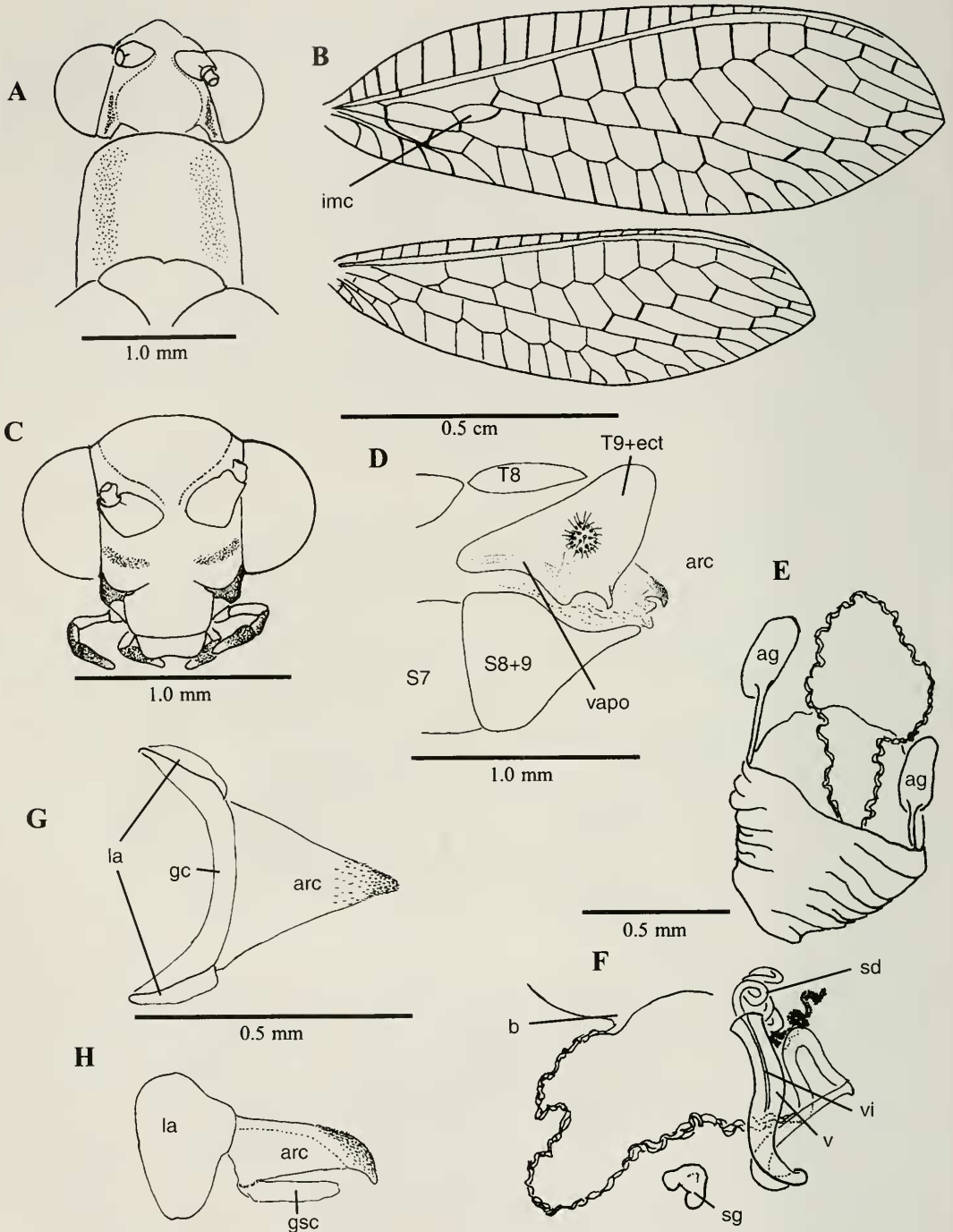


FIGURE 35. *Chrysopodes (Neosuarius) divisa* (Walker, 1853). A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen; E. Female genitalia; F. Spermatheca; G. Male genitalia, dorsal view; H. Male genitalia, lateral view.

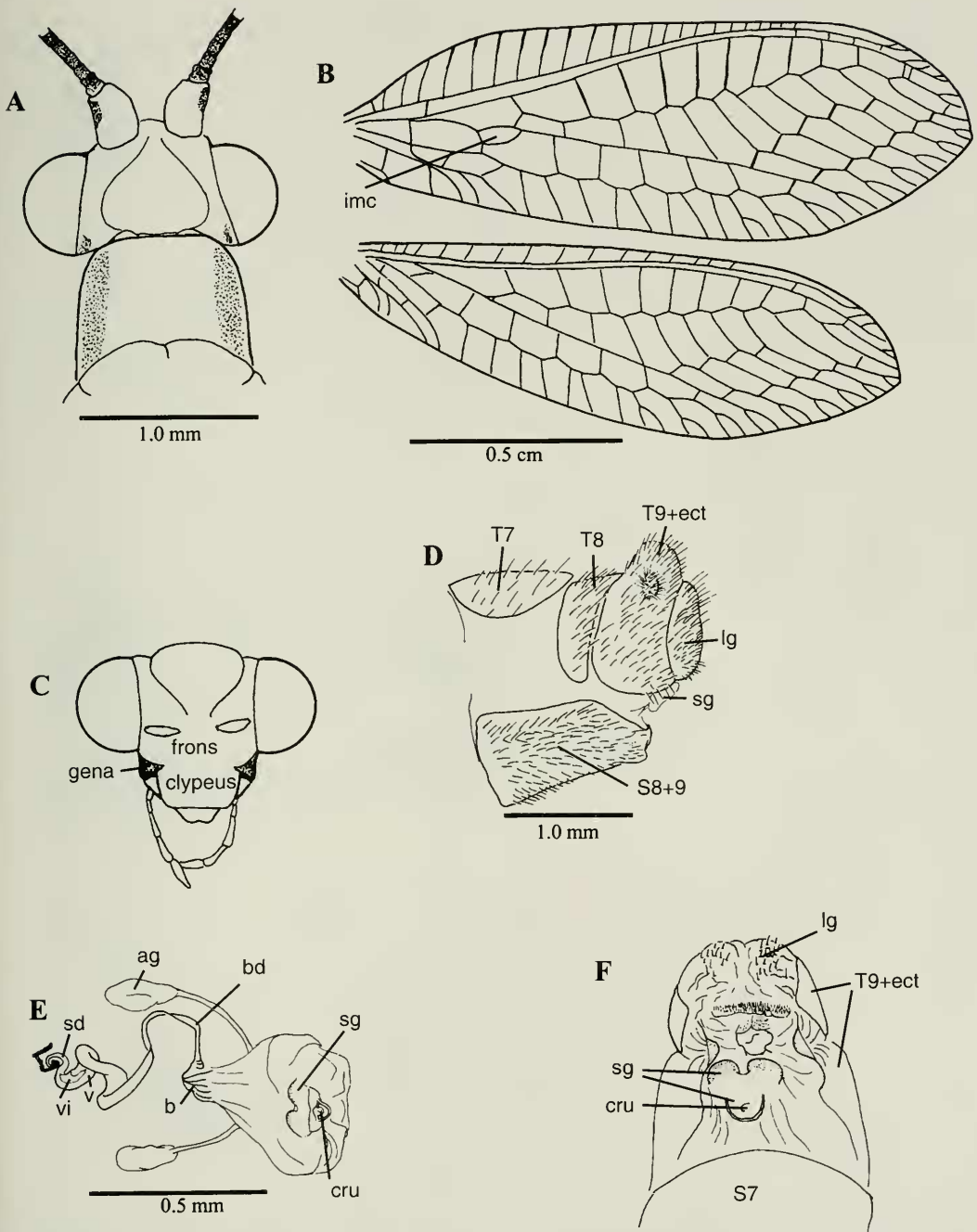


FIGURE 36. *Chrysopodes (Neosuarius) karinae* Adams and Penny. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen, lateral view; E. Female genitalia; F. Apex of female abdomen, ventral view.

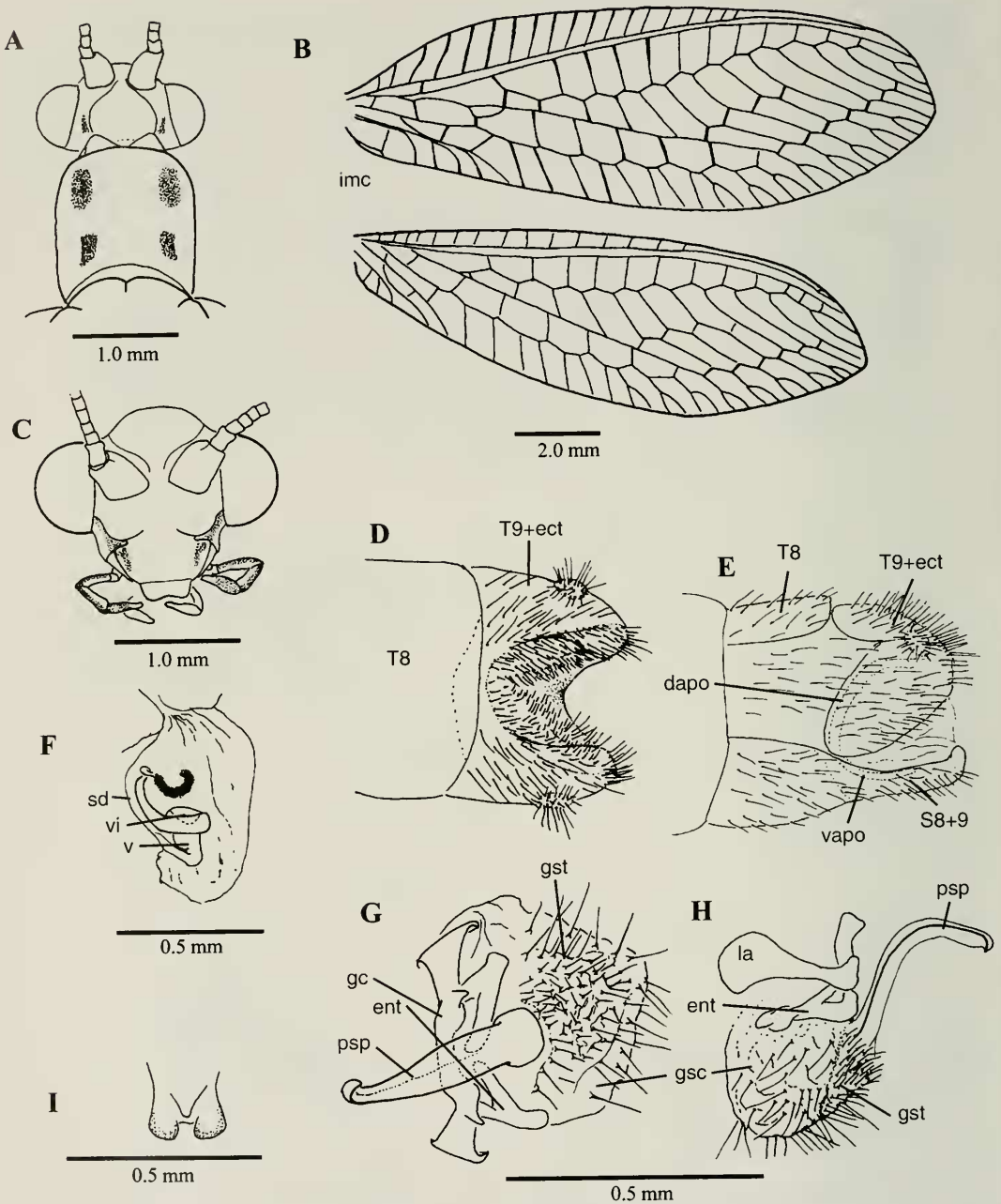


FIGURE 37. *Plesiochrysa brasiliensis* (Schneider, 1851). A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen, dorsal view; E. Apex of male abdomen, lateral view; F. Female genitalia; G. Male genitalia, dorsal view; H. Male genitalia, lateral view; I. Subgenitale.

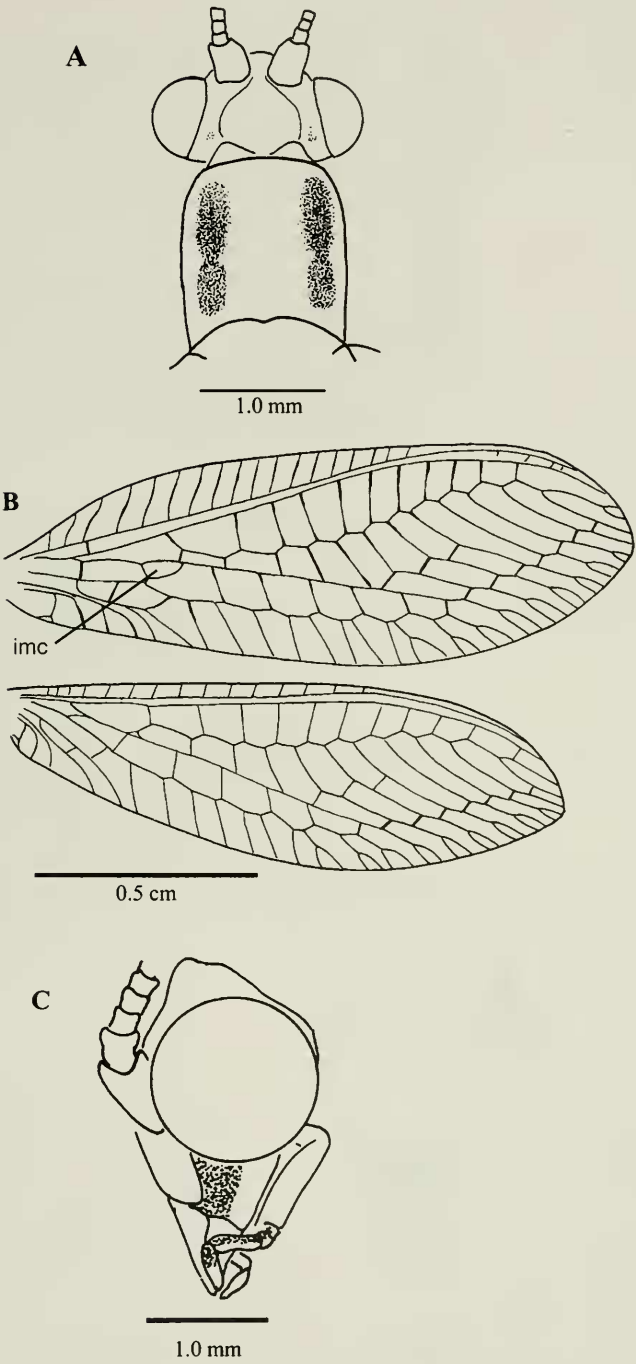


FIGURE 38. *Plesiochrysa elongata* (Navás, 1913). A. Head and prothorax, dorsal view; B. Wings; C. Head, lateral view.

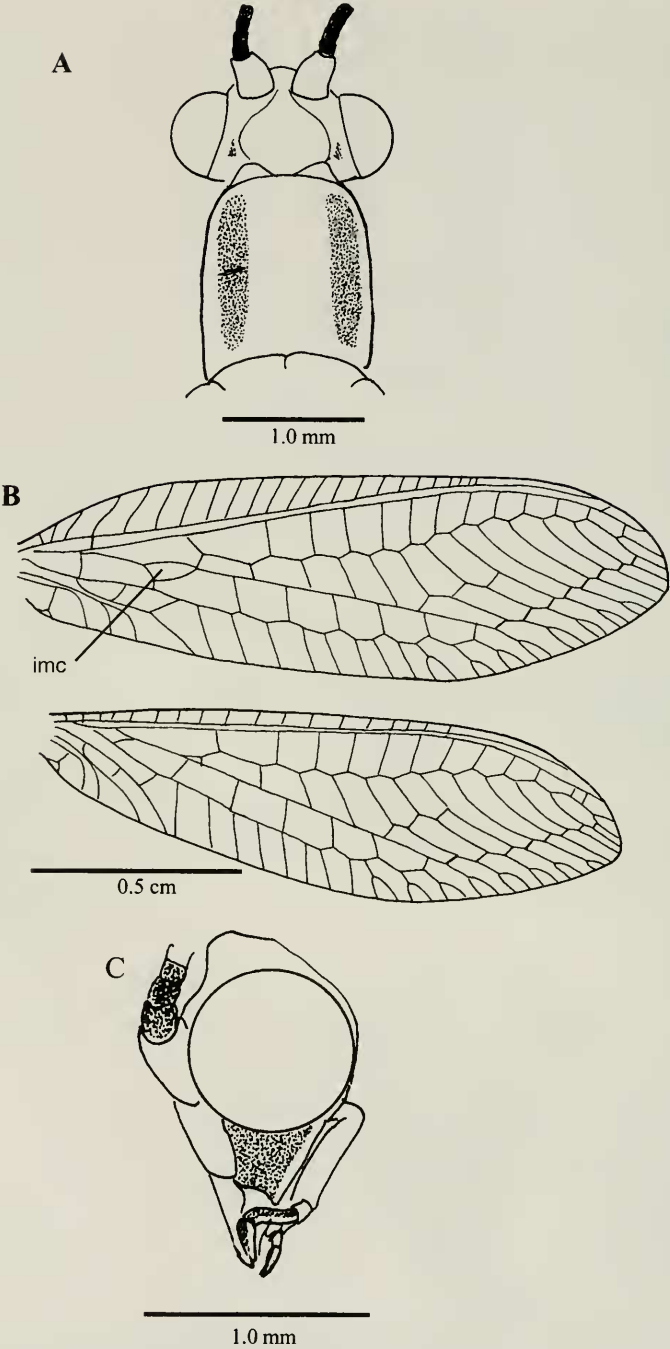


FIGURE 39. *Plesiochrysa alytos*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, lateral view.

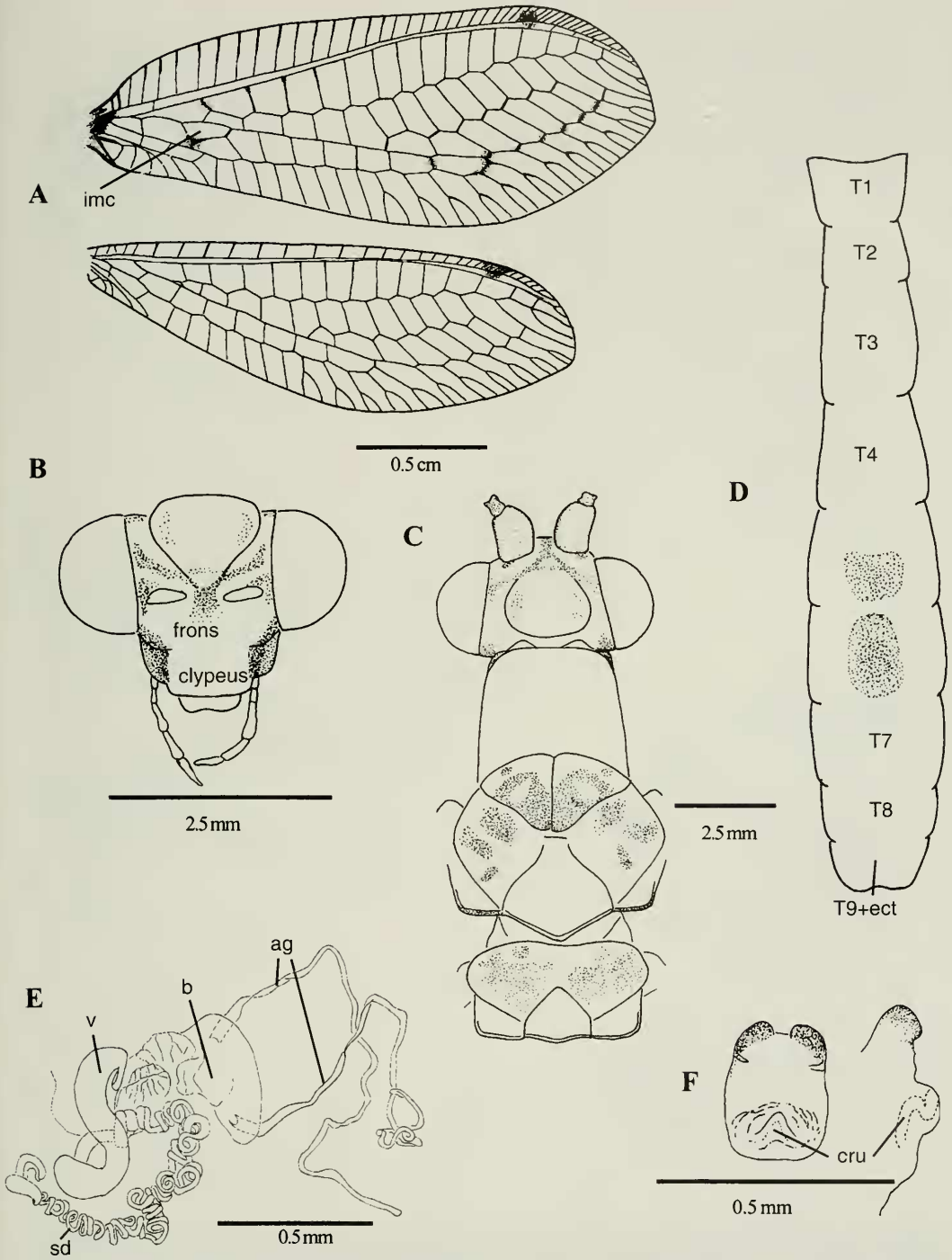


FIGURE 40. *Leucochrysa (Leucochrysa) ampla* (Walker, 1853). A. Wings; B. Head, frontal view; C. Head and prothorax, dorsal view; D. Abdomen, dorsal view; E. Female genitalia; F. Subgenitale.

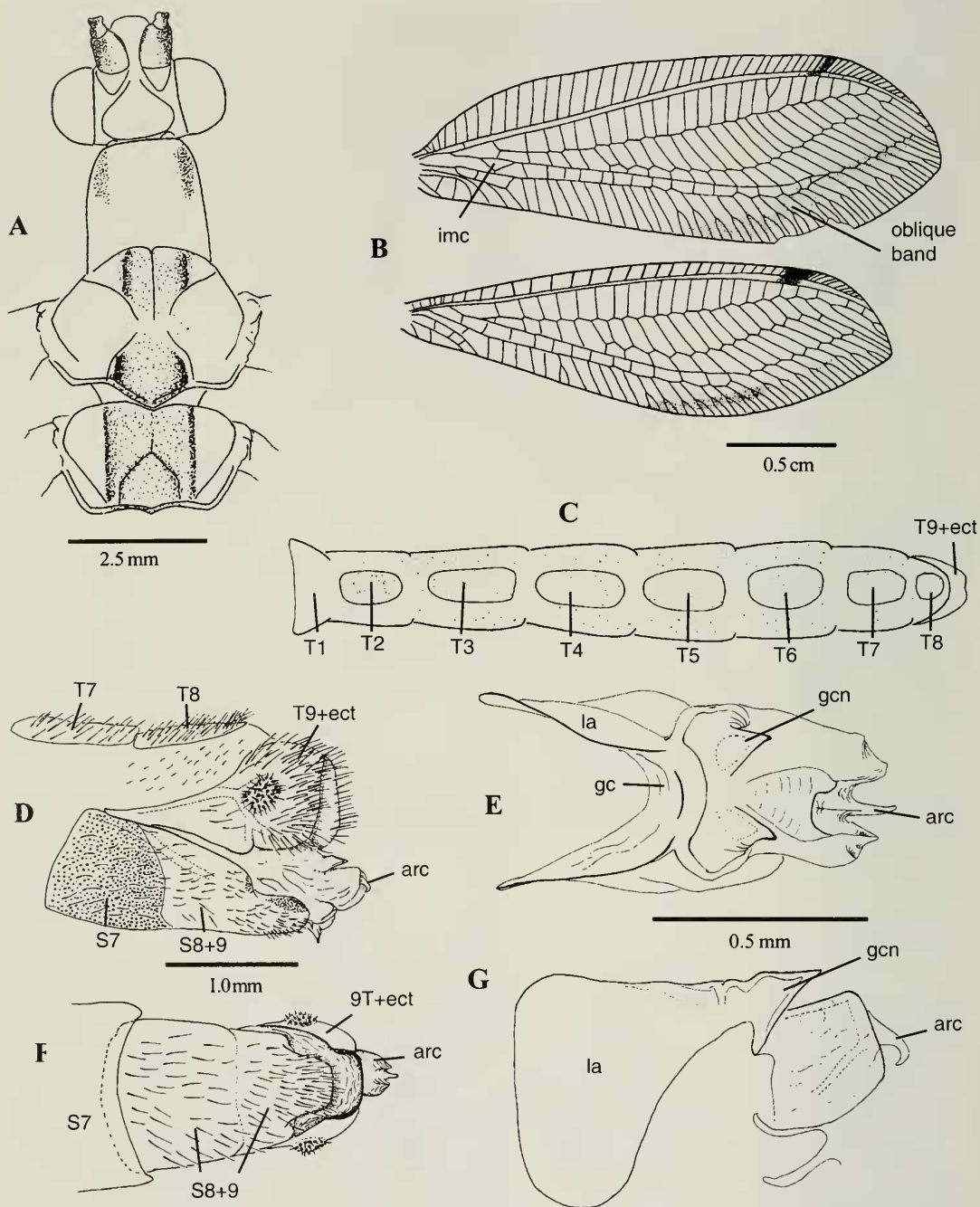


FIGURE 41. *Leucochrysa (Leucochrysa) boxi* Navás, 1930. A. Head and prothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Apex of male abdomen, lateral view; E. Male genitalia dorsal; F. Sternite 8 + 9; G. Male genitalia, lateral view.

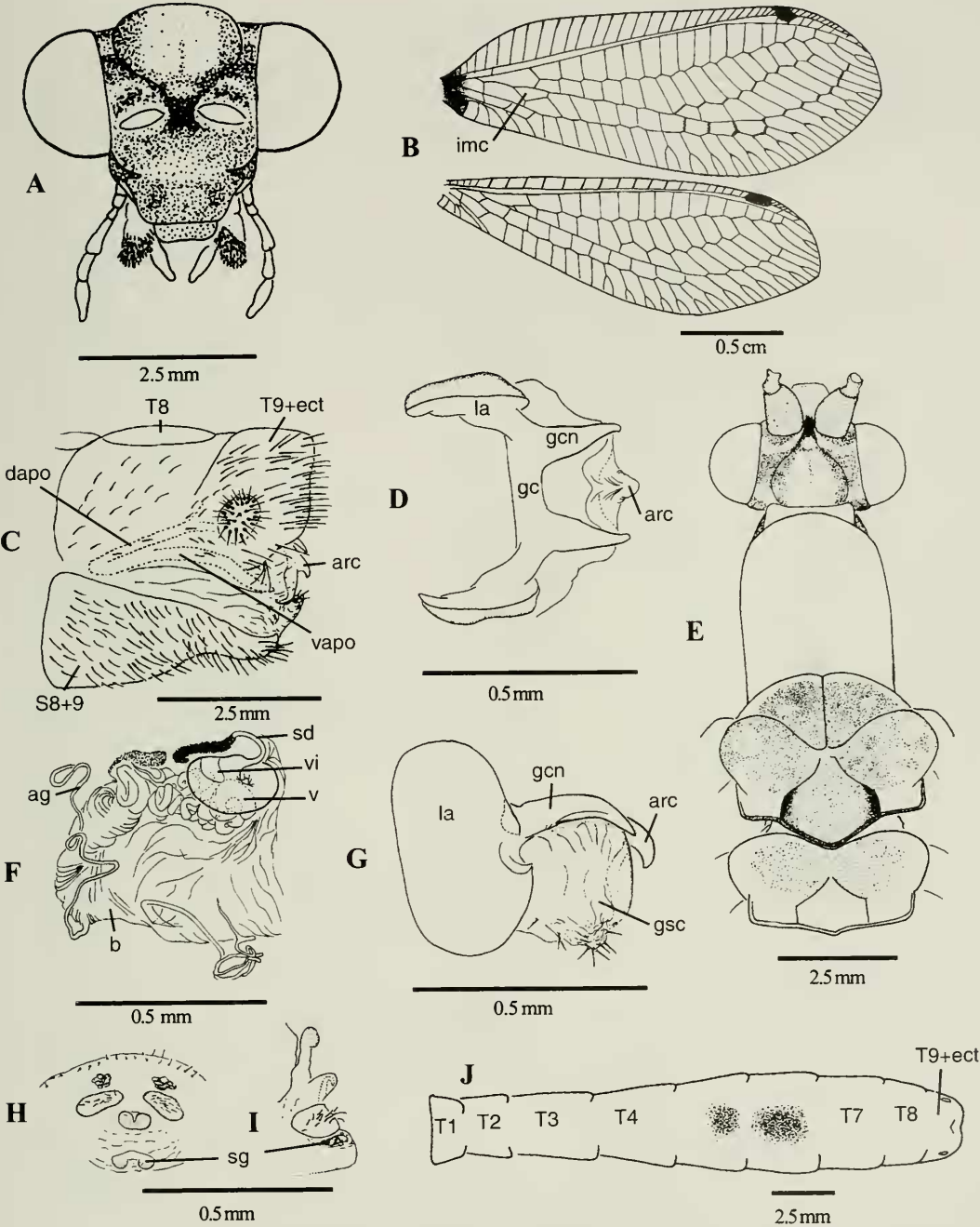


FIGURE 42. *Leucochrysa (Leucochrysa) pretiosa* (Banks, 1910). A. Head, frontal view; B. Wings; C. Apex of abdomen, lateral view; D. Male genitalia, dorsal view; E. Head and prothorax, dorsal view; F. Female genitalia; G. Male genitalia, lateral view; H. Subgenitale, dorsal view; I. Subgenitale, lateral view; J. Abdomen, dorsal view.

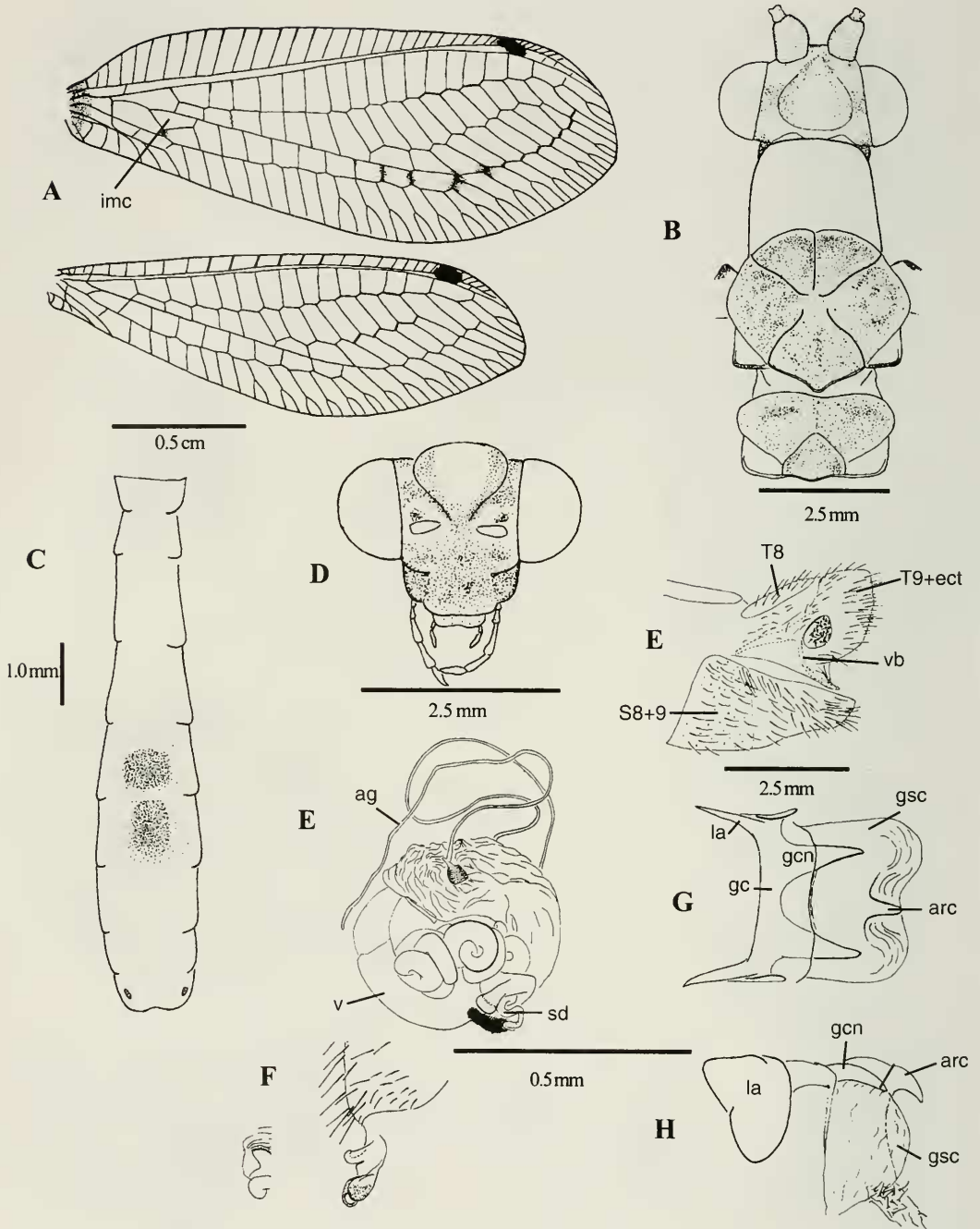


FIGURE 43. *Leucochrysa (Leucochrysa) varia* (Schneider, 1851). A. Wings; B. Head and pro- and mesothorax, dorsal view; C. Abdomen, dorsal view; D. Head, frontal view; E. Female genitalia; F. Subgenitalia; G. Male genitalia, dorsal view; H. Male genitalia, lateral view.

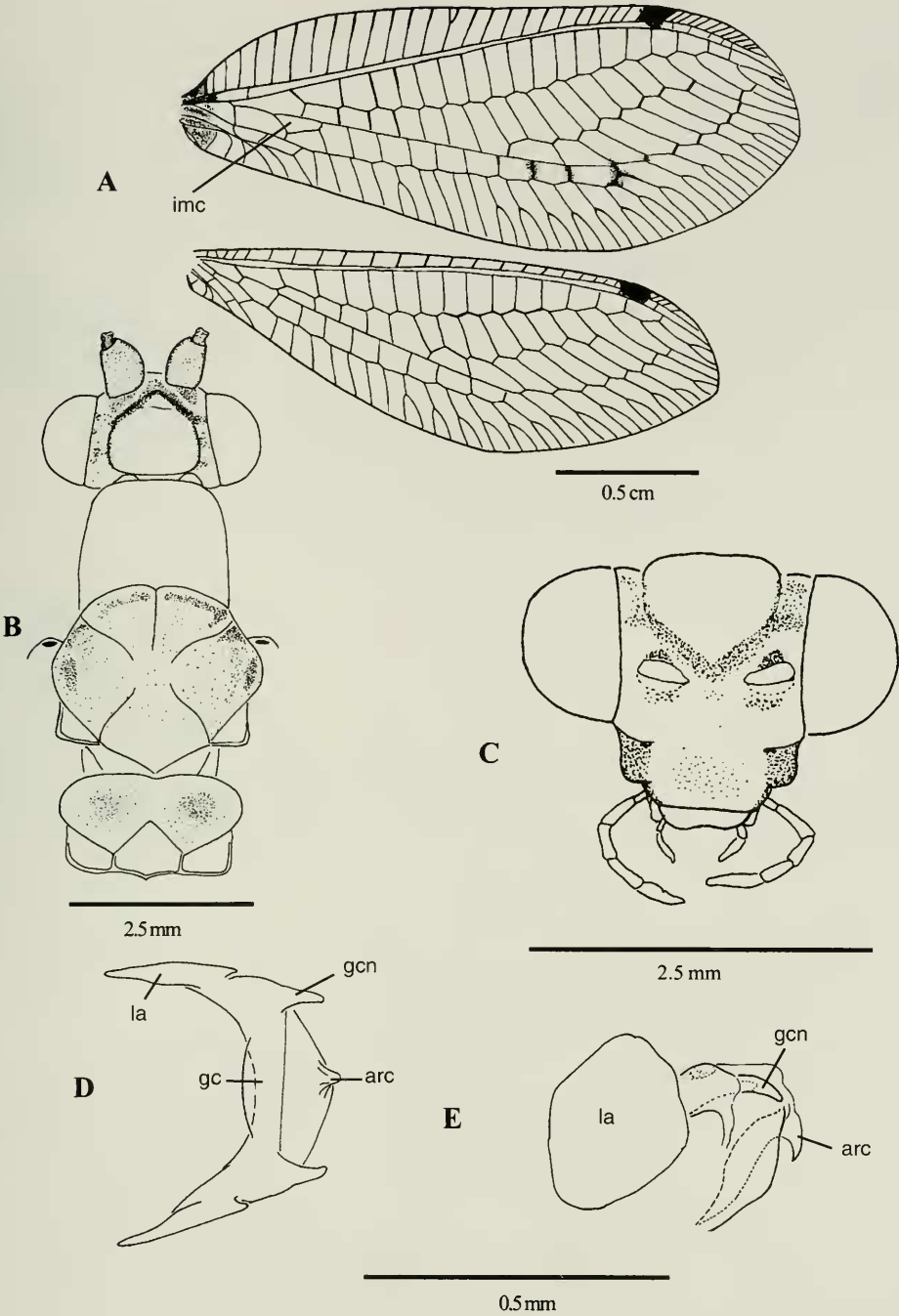


FIGURE 44. *Leucochrysa (Leucochrysa) walkerina* Navás, 1913. A. Wings; B. Head, pro- and mesothorax, dorsal view; C. Head, frontal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view.

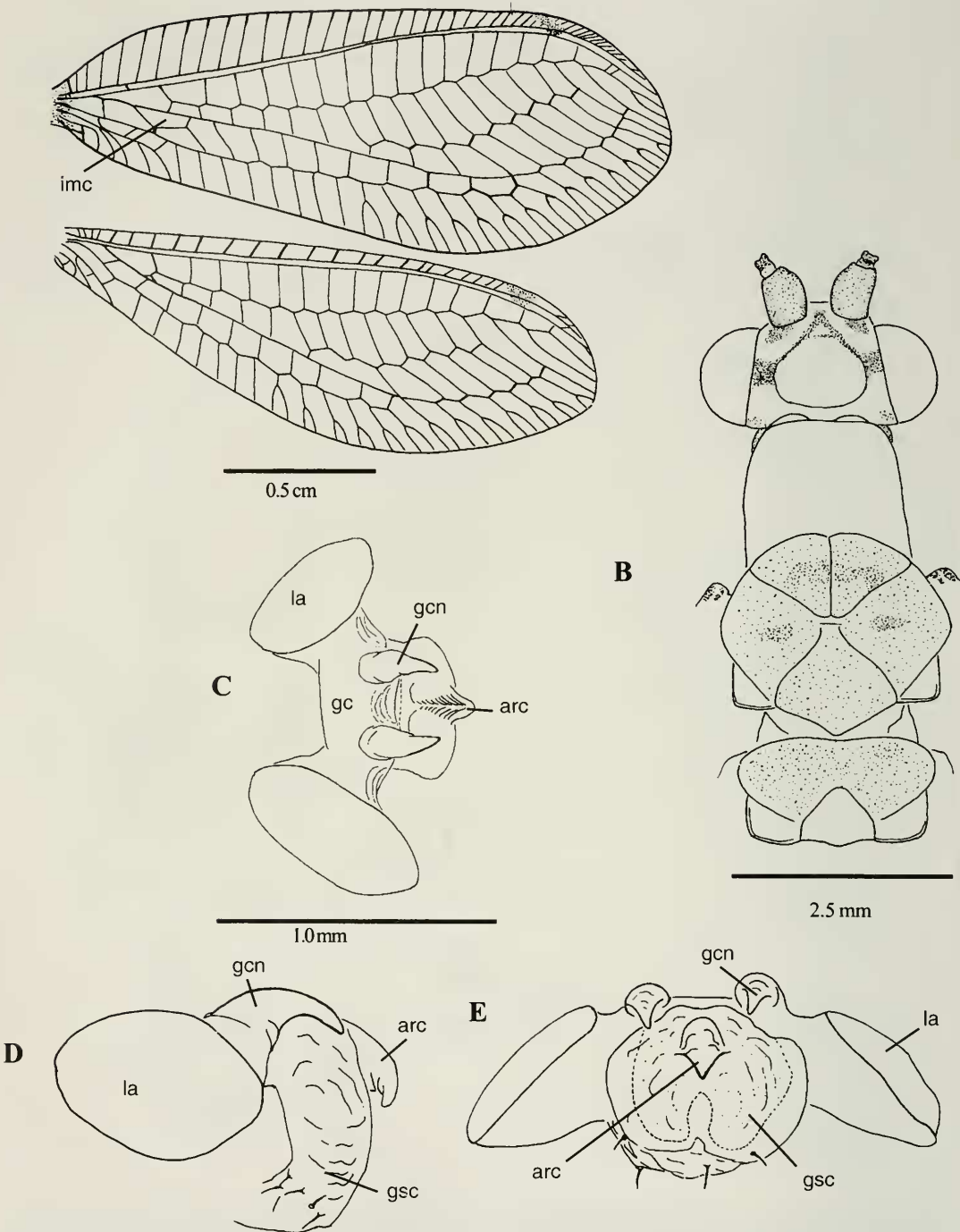


FIGURE 45. *Leucochrysa (Leucochrysa) bruneolus*, new species. A. Wings; B. Head, pro- and mesothorax, dorsal view; C. Male genitalia, dorsal view; D. Male genitalia, lateral view; E. Male genitalia, caudal view.

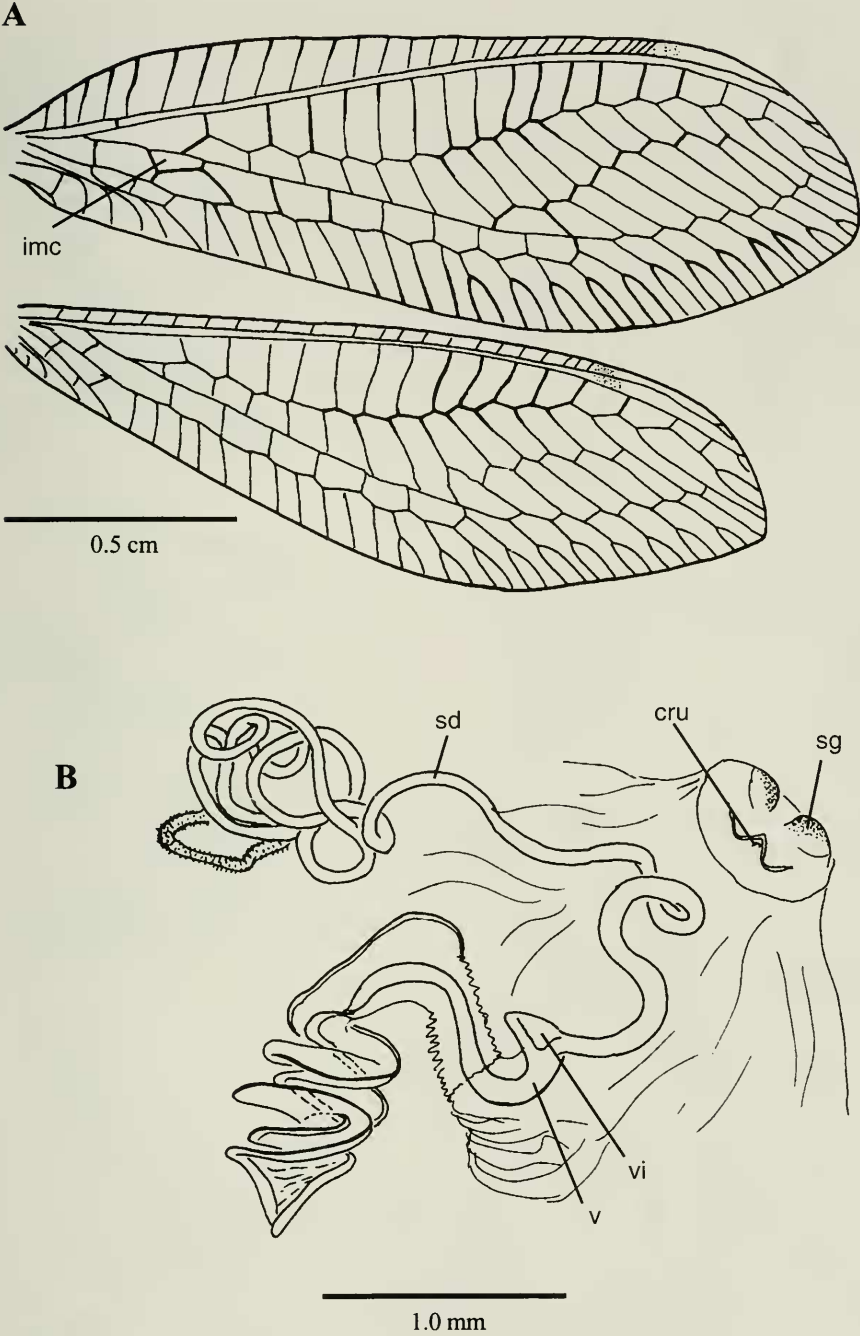


FIGURE 46. *Leucochrysa (Leucochrysa) catarinae* new species. A. Wings; B. Female genitalia.

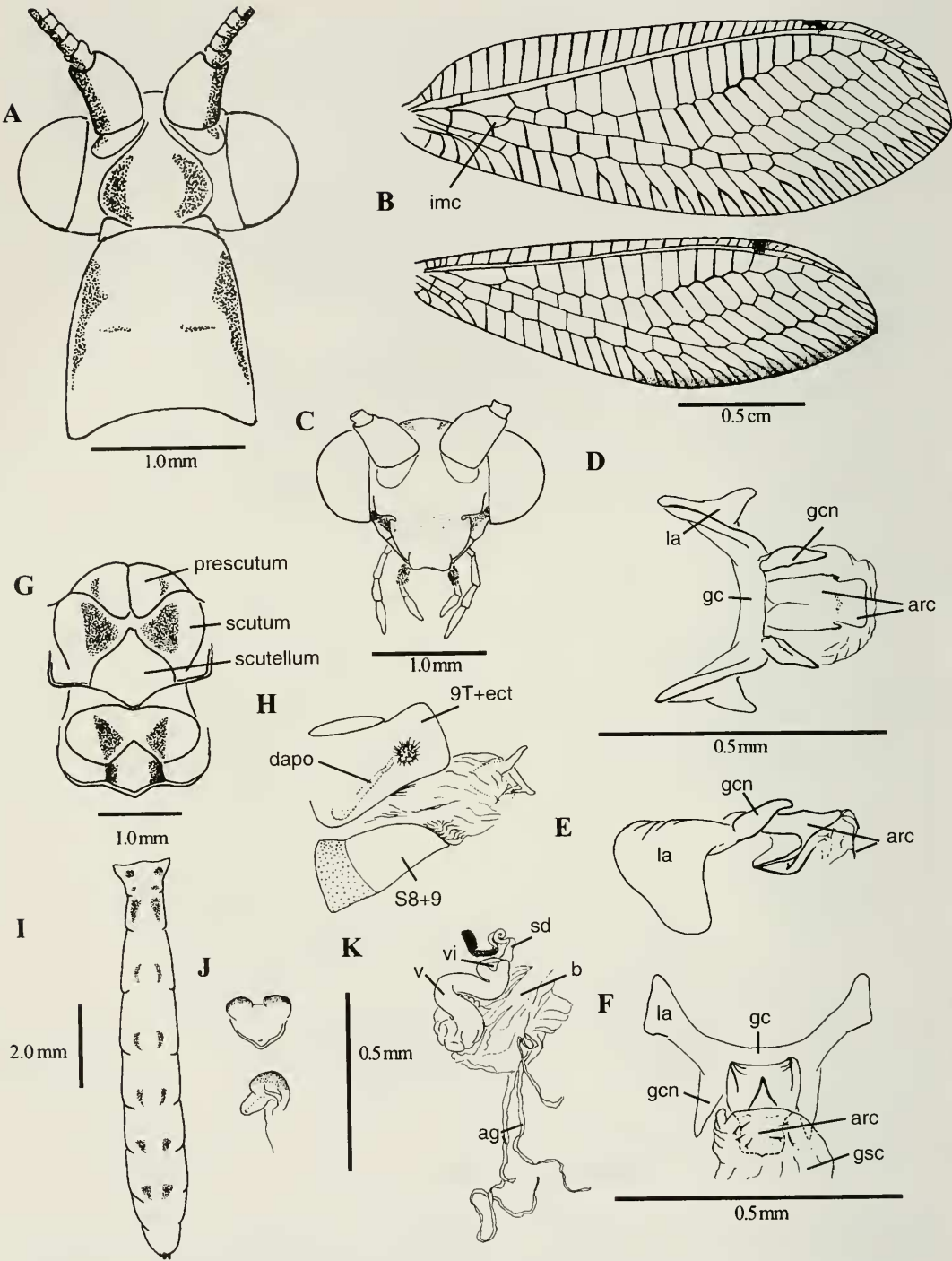


FIGURE 47. *Leucochrysa (Nodita) camposi* Navás, 1933. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view; F. Male genitalia, ventral view; G. Meso- and metanotum; H. Apex of abdomen, lateral view; I. Abdomen, dorsal view; J. Subgenitale; K. Female genitalia.

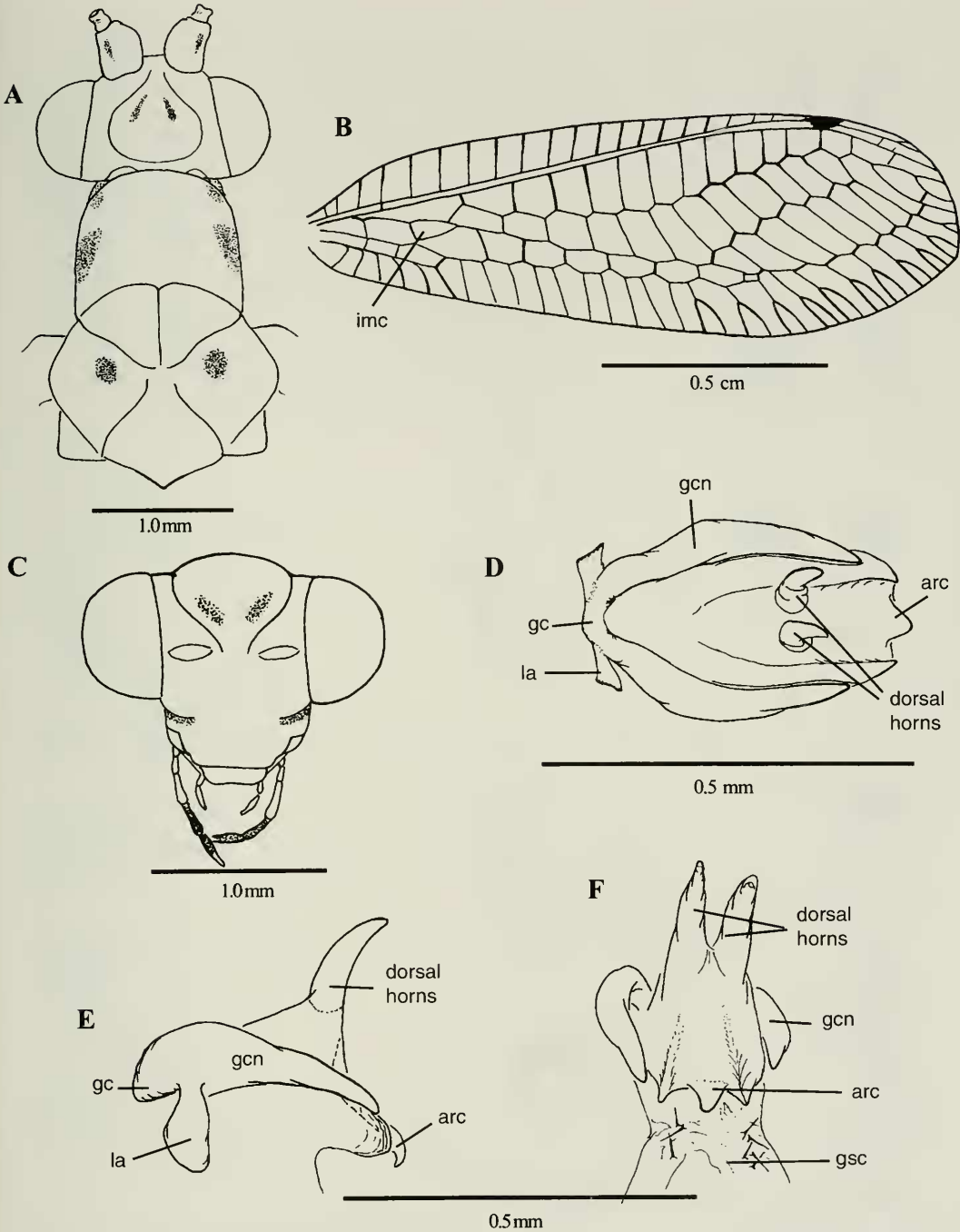


FIGURE 48. *Leucochrysa (Nodita) clepsydra* Banks, 1918. A. Head and prothorax, dorsal view; B. Forewing; C. Head, frontal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view; F. Male genitalia, caudal view.

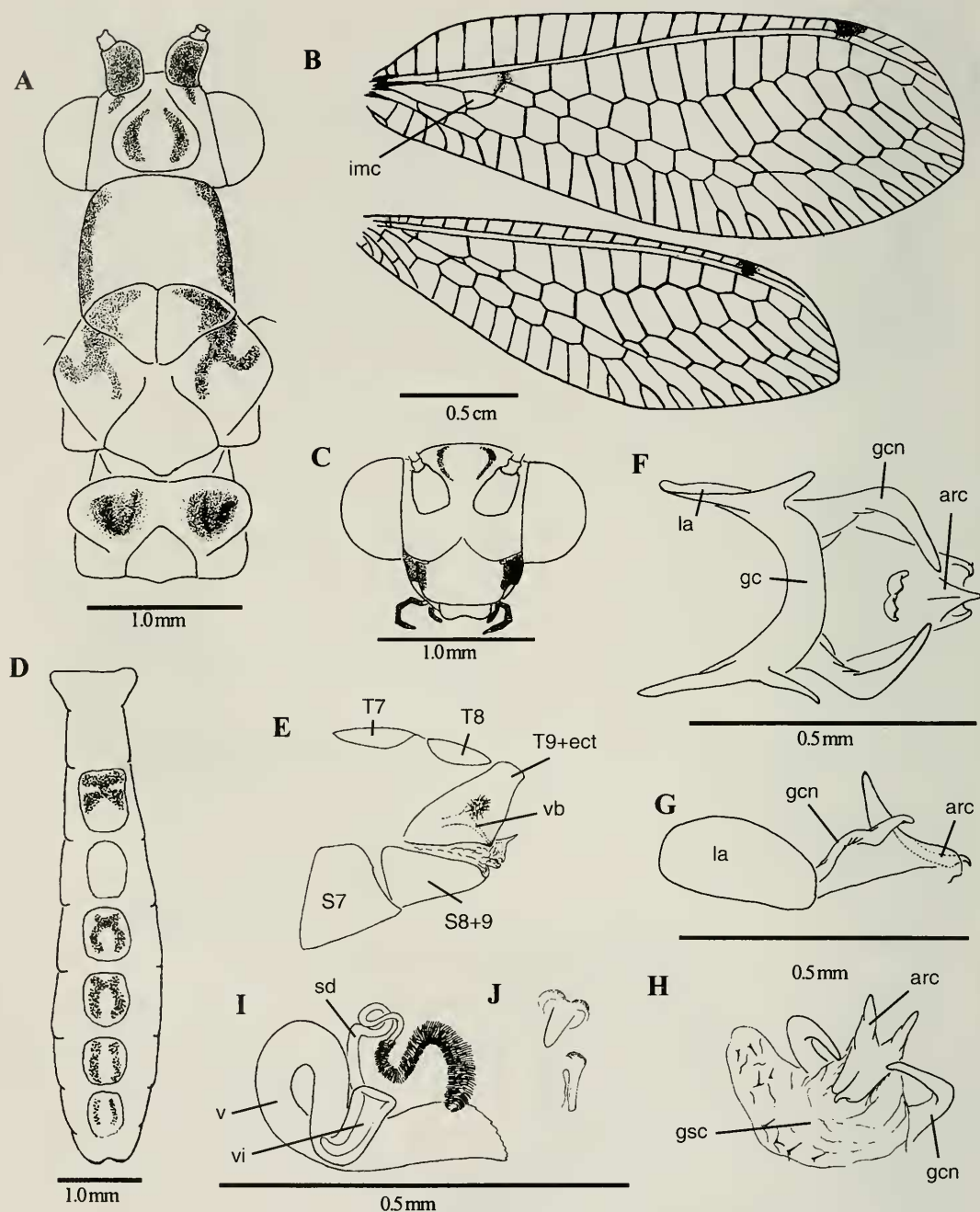


FIGURE 49. *Leucochrysa (Nodita) cruentata* (Schneider, 1851). A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Head, frontal view; D. Abdomen, dorsal view; E. Apex of male abdomen, lateral view; F. Male genitalia, dorsal view; G. Male genitalia, lateral view; H. Male genitalia, caudal view; I. Spermatheca; J. Subgenitale.

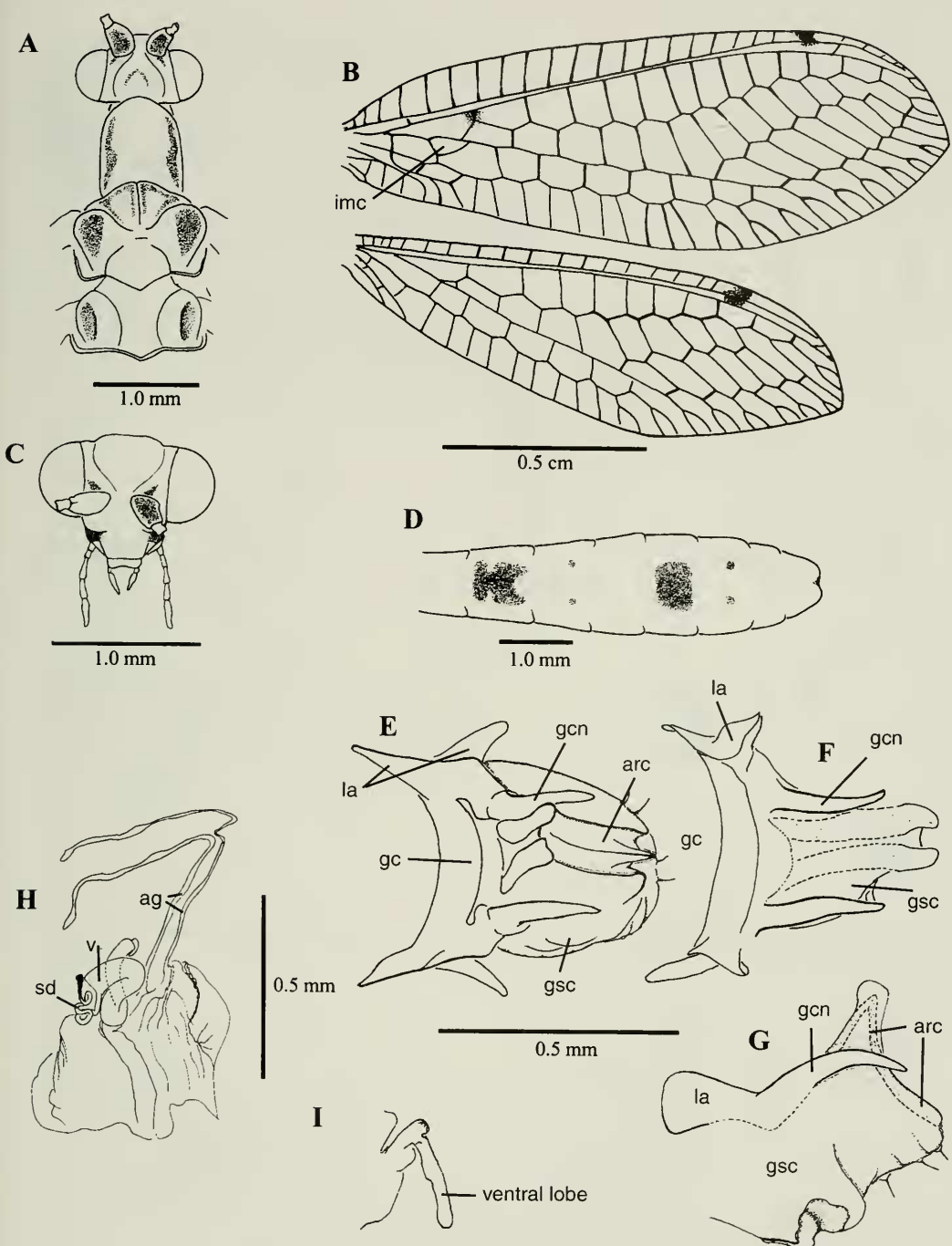


FIGURE 50. *Leucochrysa (Nodita) gossei* (Kimmins, 1940). A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Head, frontal view; D. Abdomen, dorsal view; E. Male genitalia, dorso-caudal view; F. Male genitalia, dorsal view; G. Male genitalia, lateral view; H. Female genitalia; I. Subgenitale.

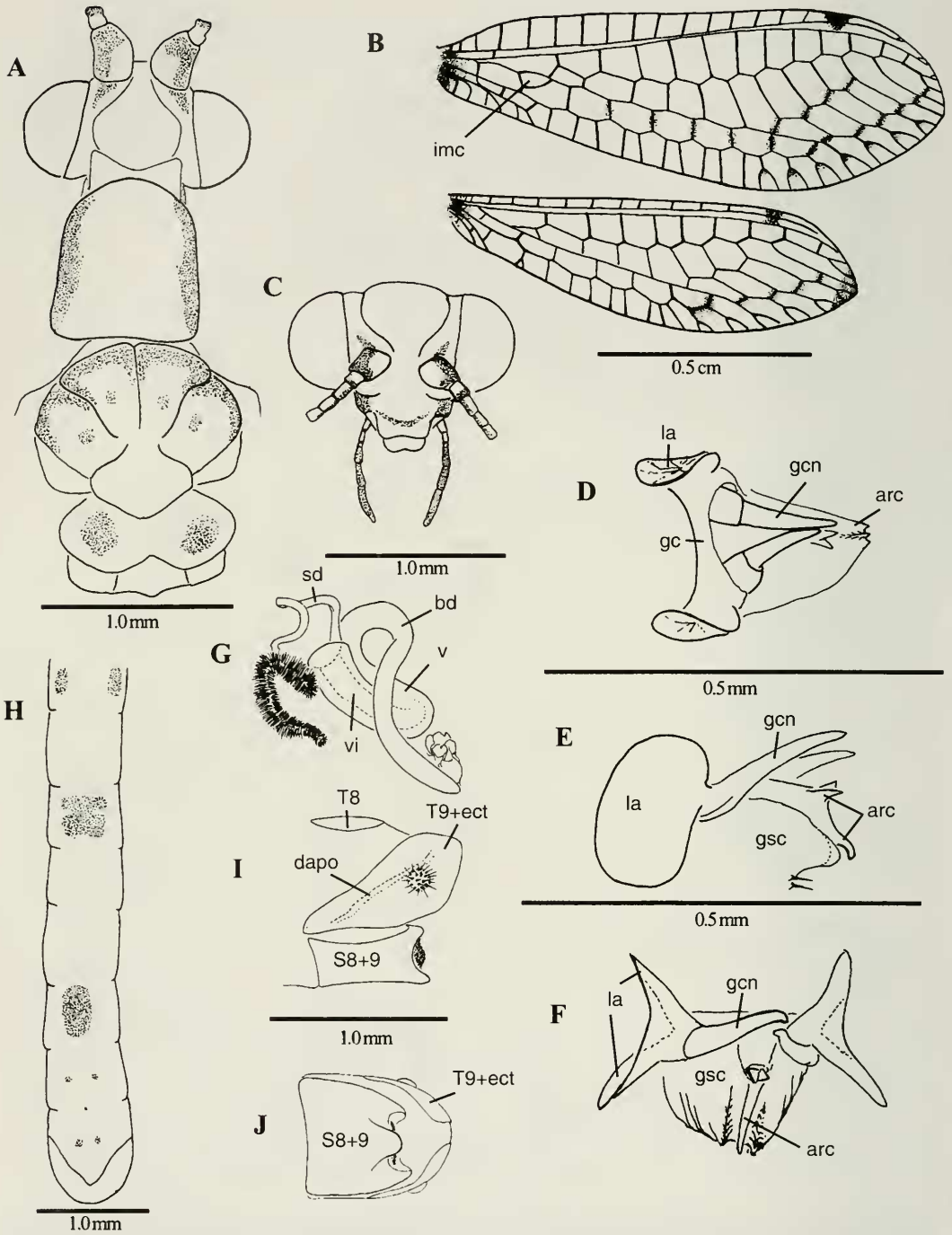


FIGURE 51. *Leucochrysa (Nodita) heriocles* Banks, 1944. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Head, frontal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view; F. Male genitalia, caudal view; G. Spermatheca; H. Abdomen, dorsal view; I. Apex of male abdomen, lateral view; J. Sternite 8 + 9.

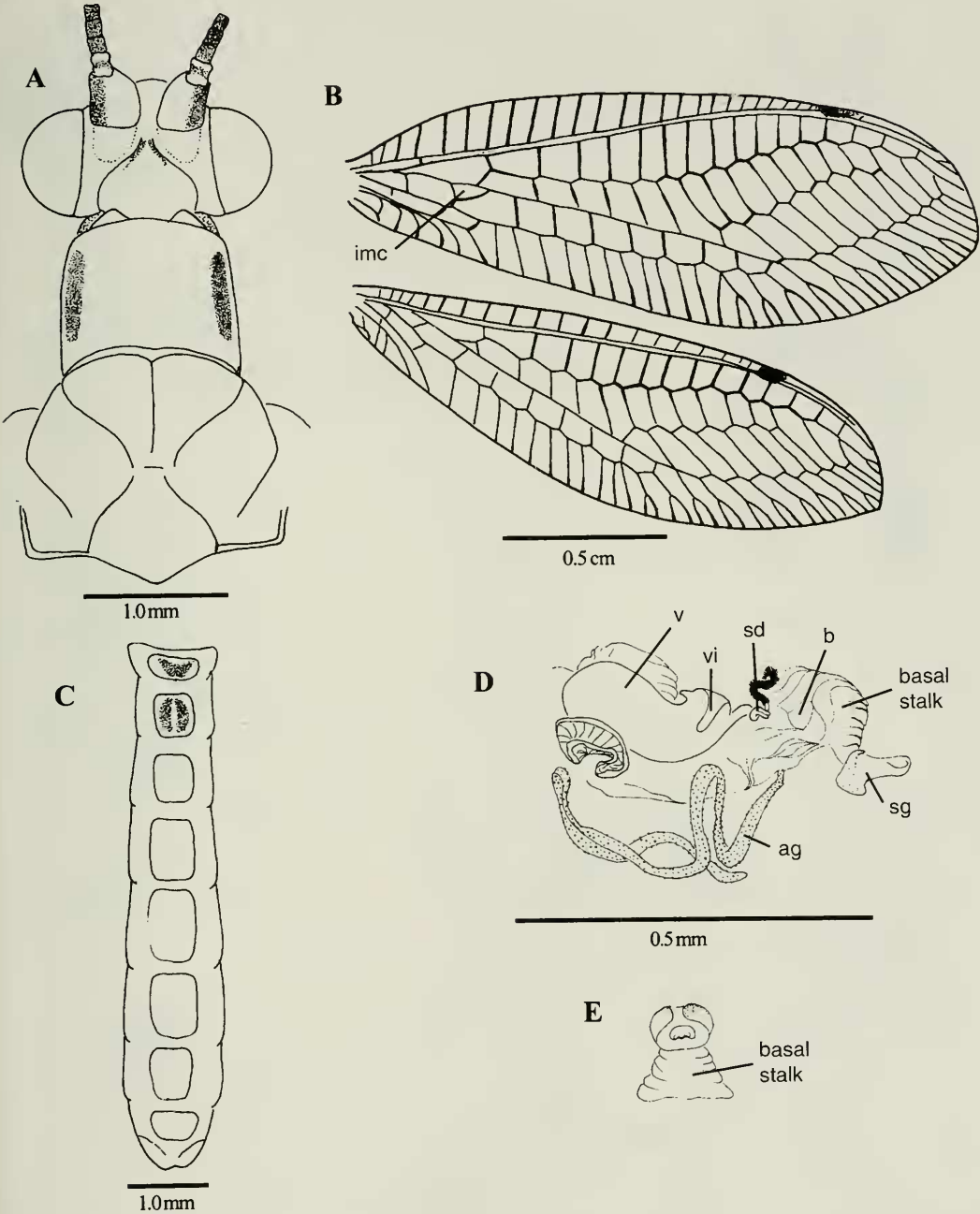


FIGURE 52. *Leucochrysa (Nodita) intermedia* (Schneider, 1851). A. Head and prothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Female genitalia; E. Subgenitale.

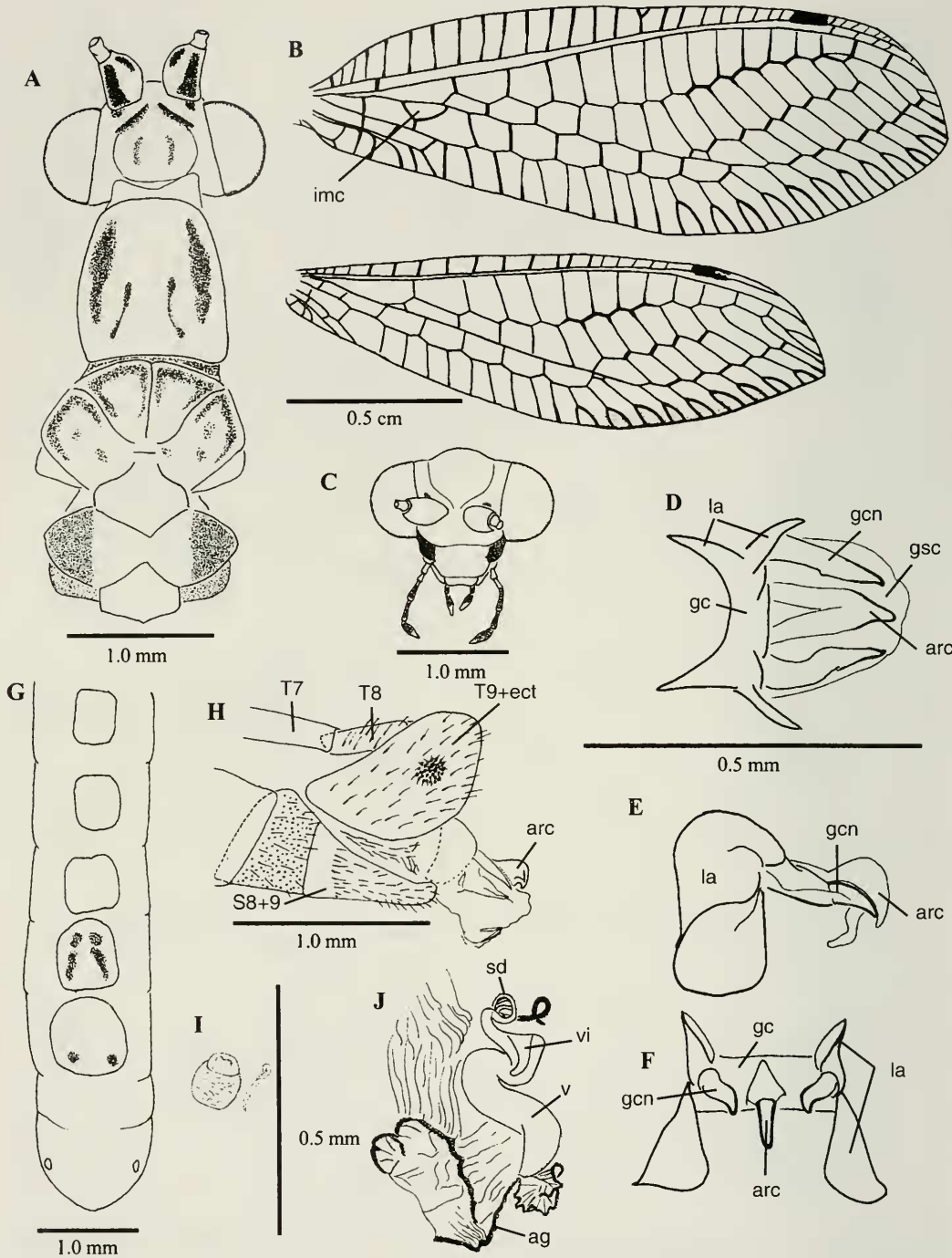


FIGURE 53. *Leucochrysa (Nodita) lancala* Banks, 1944. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view; F. Male genitalia, caudal view; G. Abdomen, dorsal view; H. Apex of male abdomen, lateral view; I. Subgenitale; J. Spermatheca.

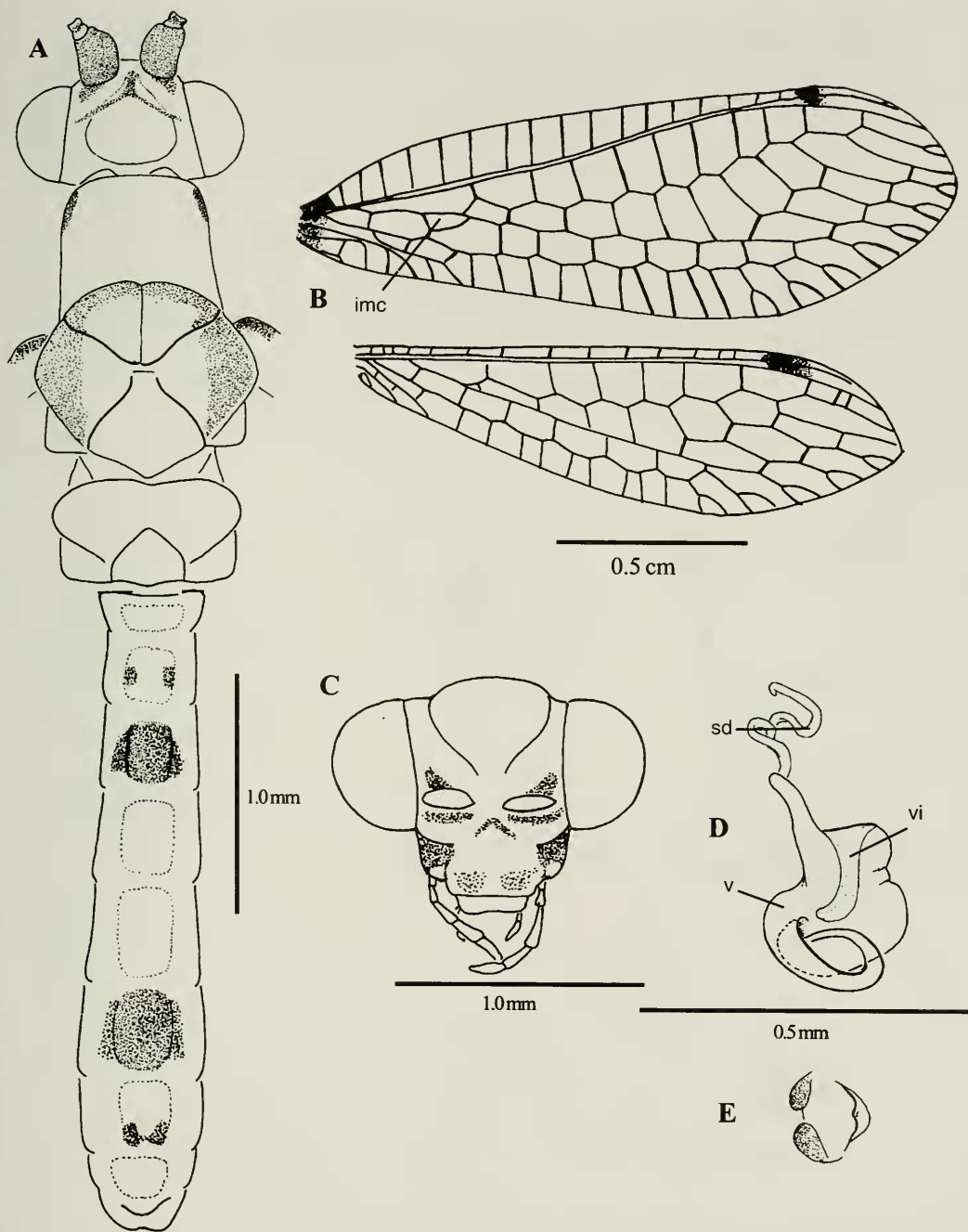


FIGURE 54. *Leucochrysa (Nodita) lateralis* Navás, 1913. A. Head, thorax and abdomen, dorsal view; B. Wings; C. Head, frontal view; D. Spermatheca; E. Subgenitale.

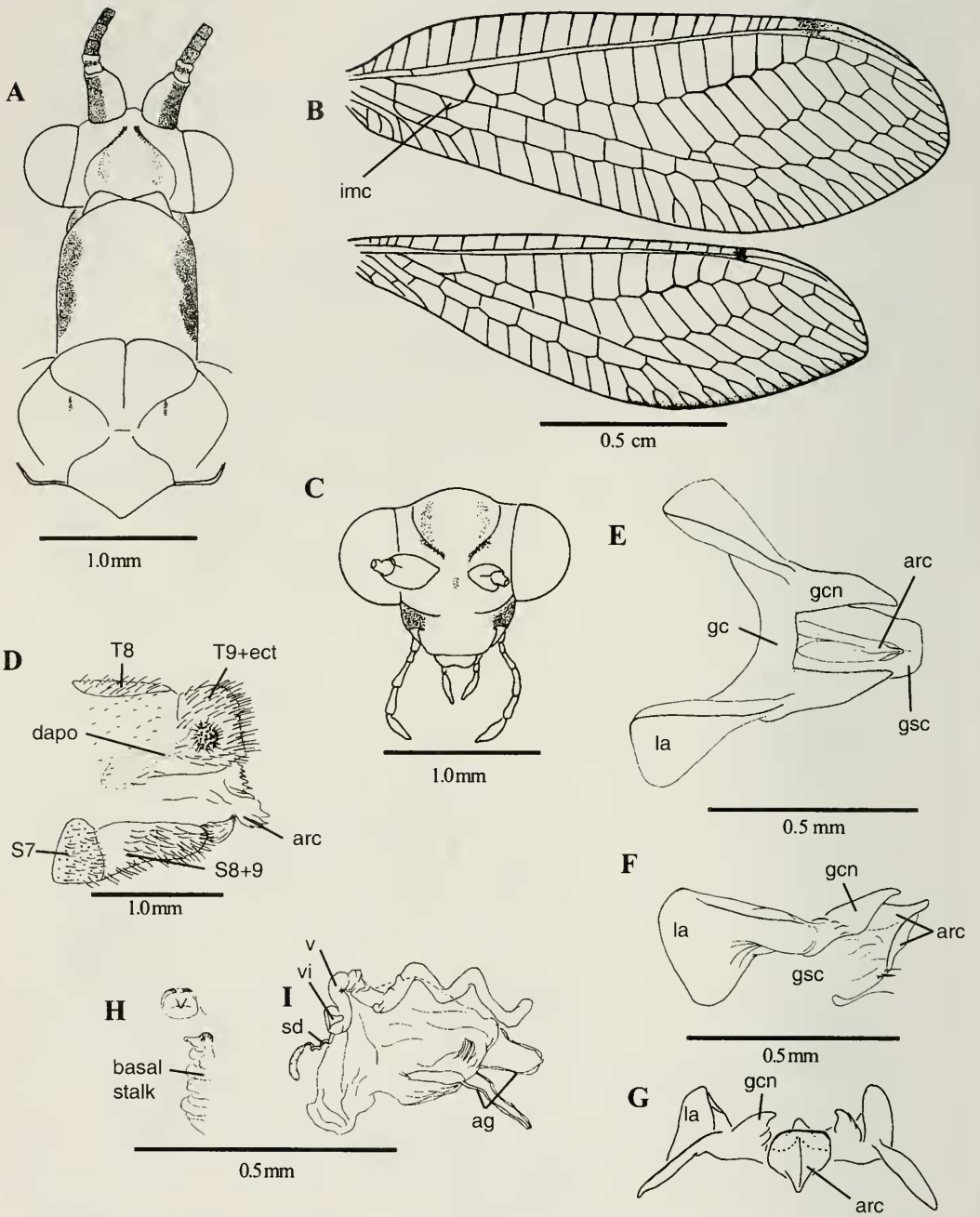


FIGURE 55. *Leucochrysa (Nodita) marginalis* (Banks, 1915). A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of male abdomen, lateral view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Male genitalia, caudal view; H. Subgenital; I. Female genitalia.

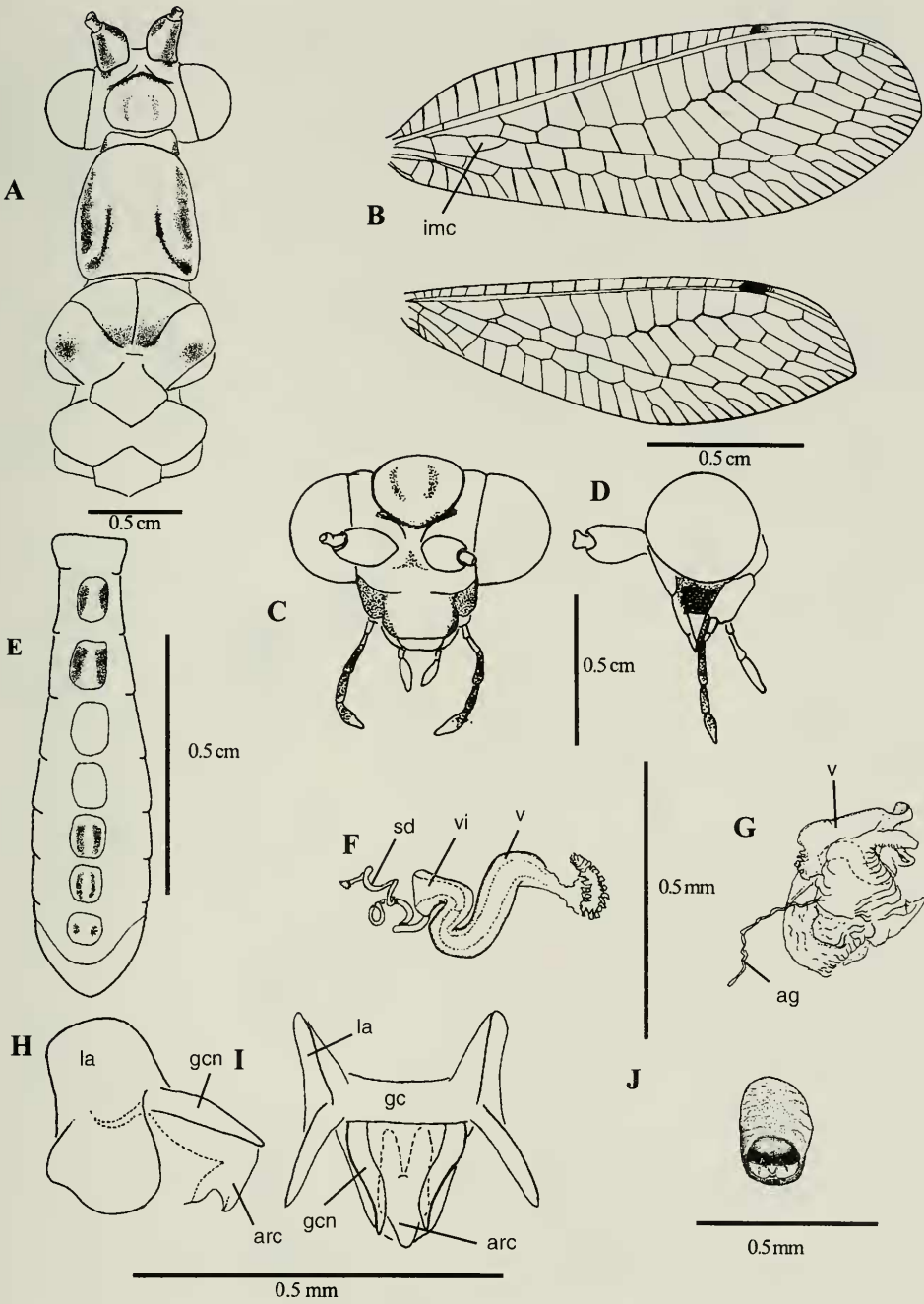


FIGURE 56. *Leucochrysa (Nodita) marquezii* Navás, 1917. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Head, lateral view; E. Abdomen, dorsal view; F. Spermatheca; G. Female genitalia; H. Male genitalia, lateral view; I. Male genitalia, dorsal view; J. Subgenitale.

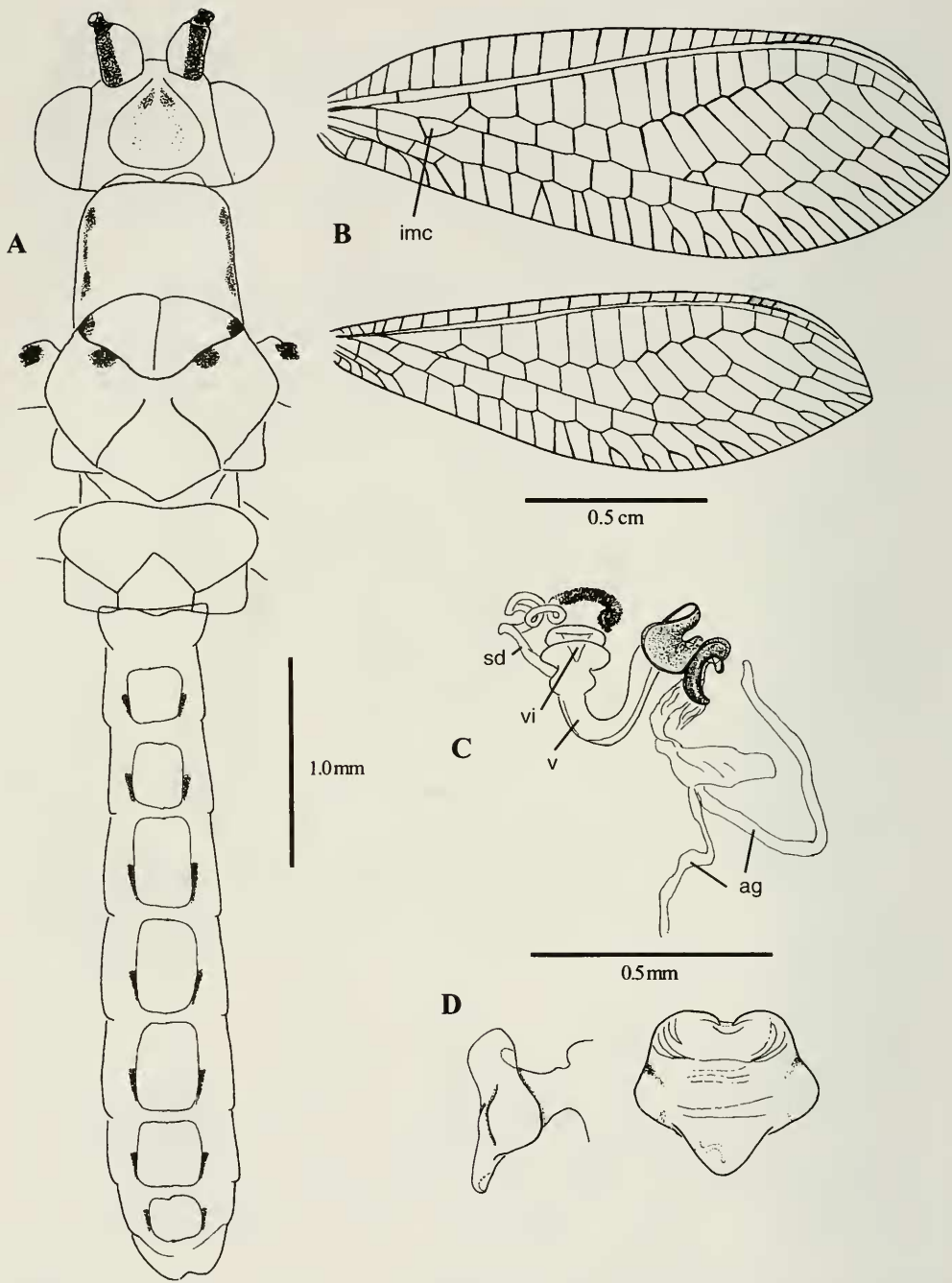


FIGURE 57. *Leucochrysa (Nodita) melanocera* Navás, 1916. A. Head, prothorax and abdomen, dorsal view; B. Wings; C. Female genitalia; D. Subgenitale.

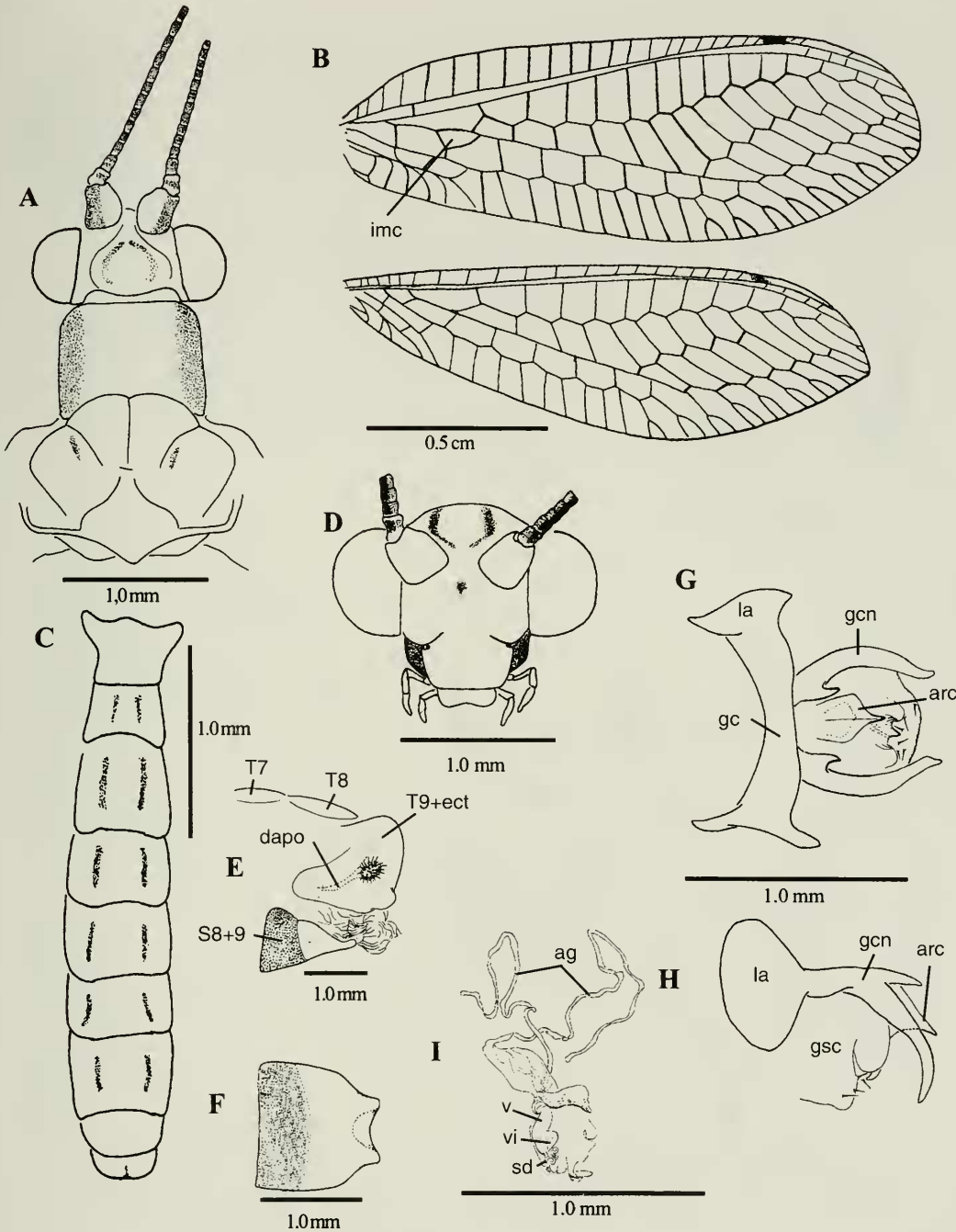


FIGURE 58. *Leucochrysa (Nodita) rodriguezi* (Navás, 1913) A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Apex of male abdomen, lateral view; F. Sternite 8 + 9; G. Male genitalia, dorsal view; H. Male genitalia, lateral view.

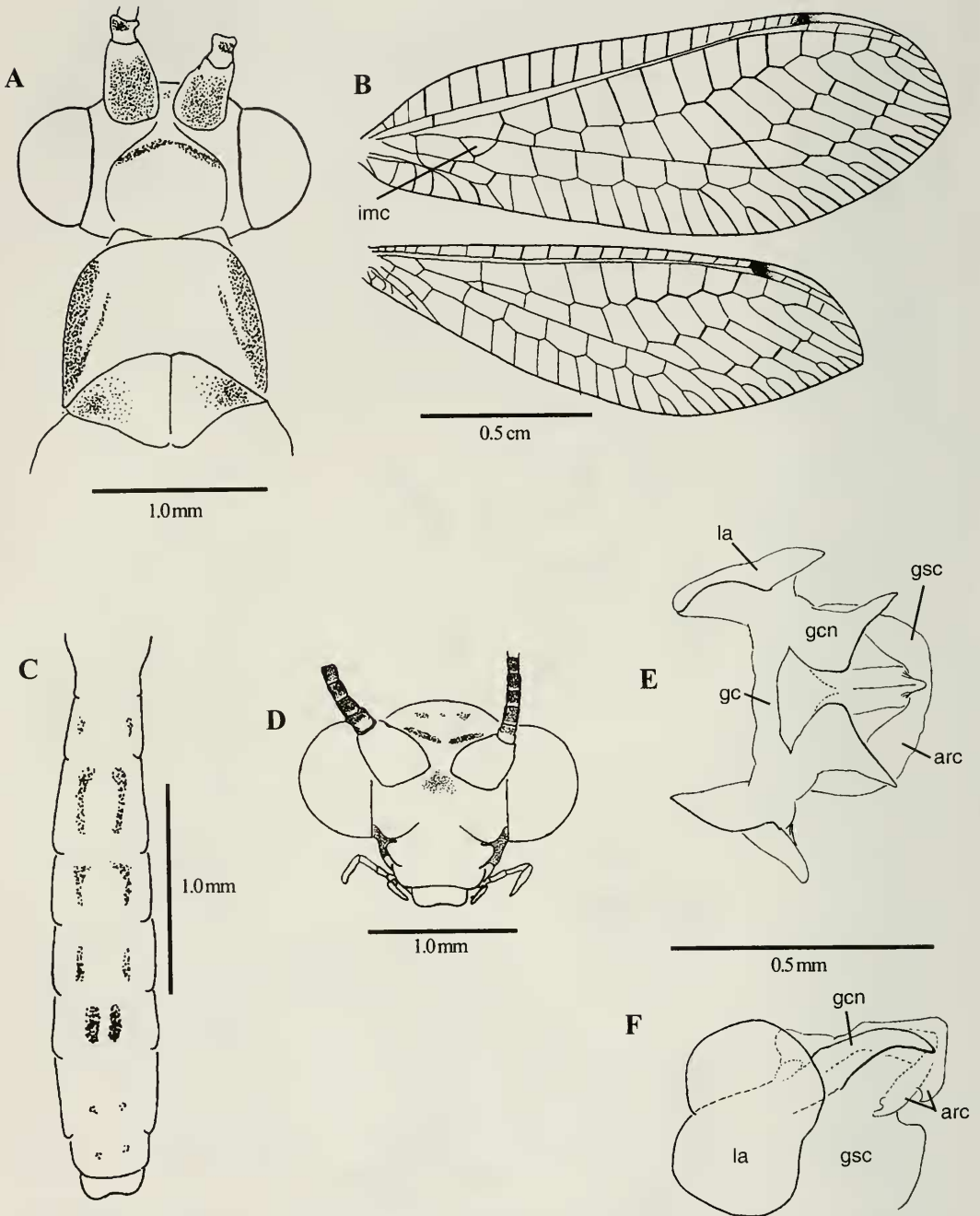


FIGURE 59. *Leucochrysa (Nodita) affinis*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view.

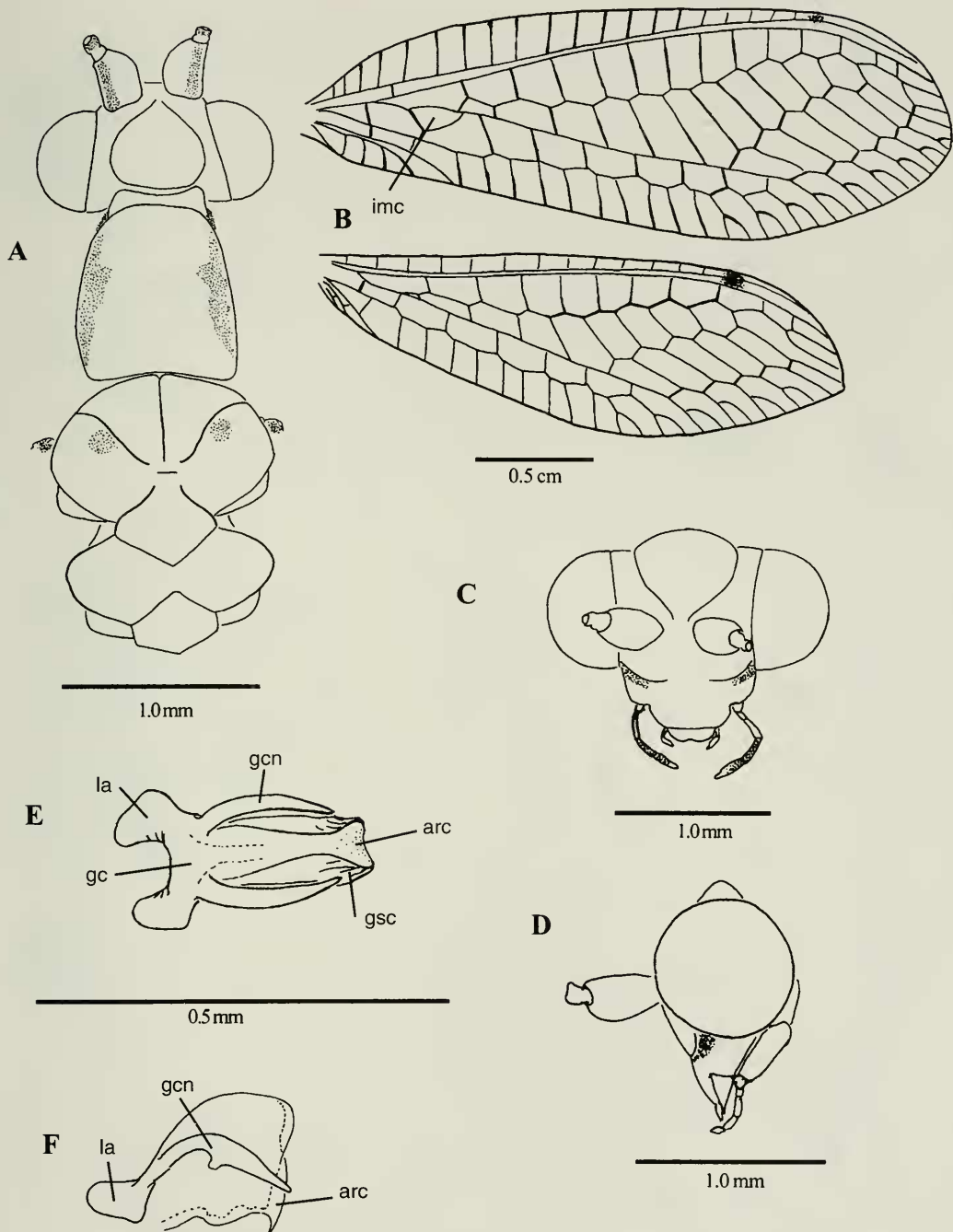


FIGURE 60. *Leucochrysa (Nodita) barrei*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Head, frontal view; D. Head, lateral view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view.

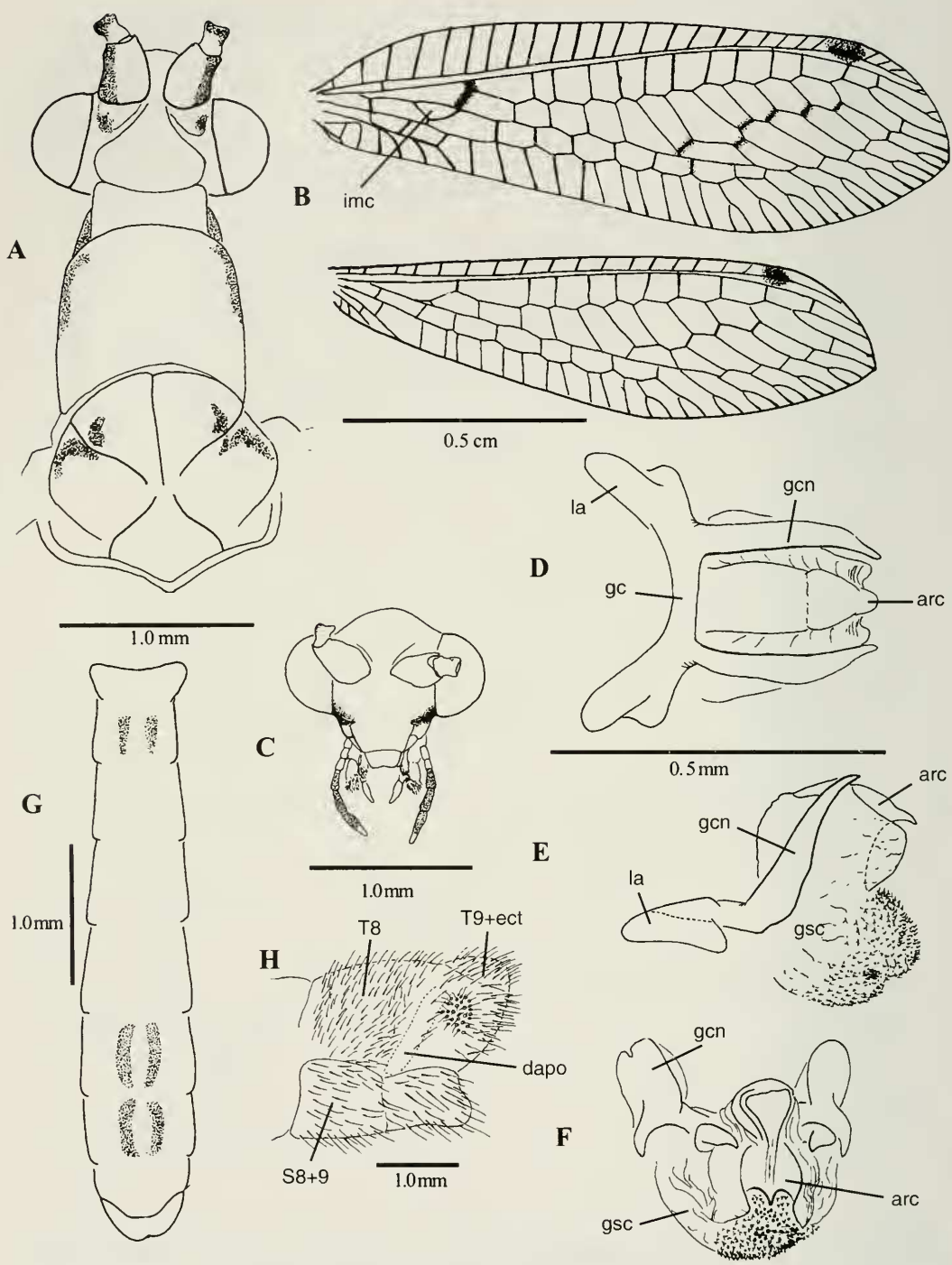


FIGURE 61. *Leucochrysa (Nodita) confusa*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view; F. Male genitalia, caudal view; G. Abdomen, dorsal view; H. Apex of male abdomen, lateral view.

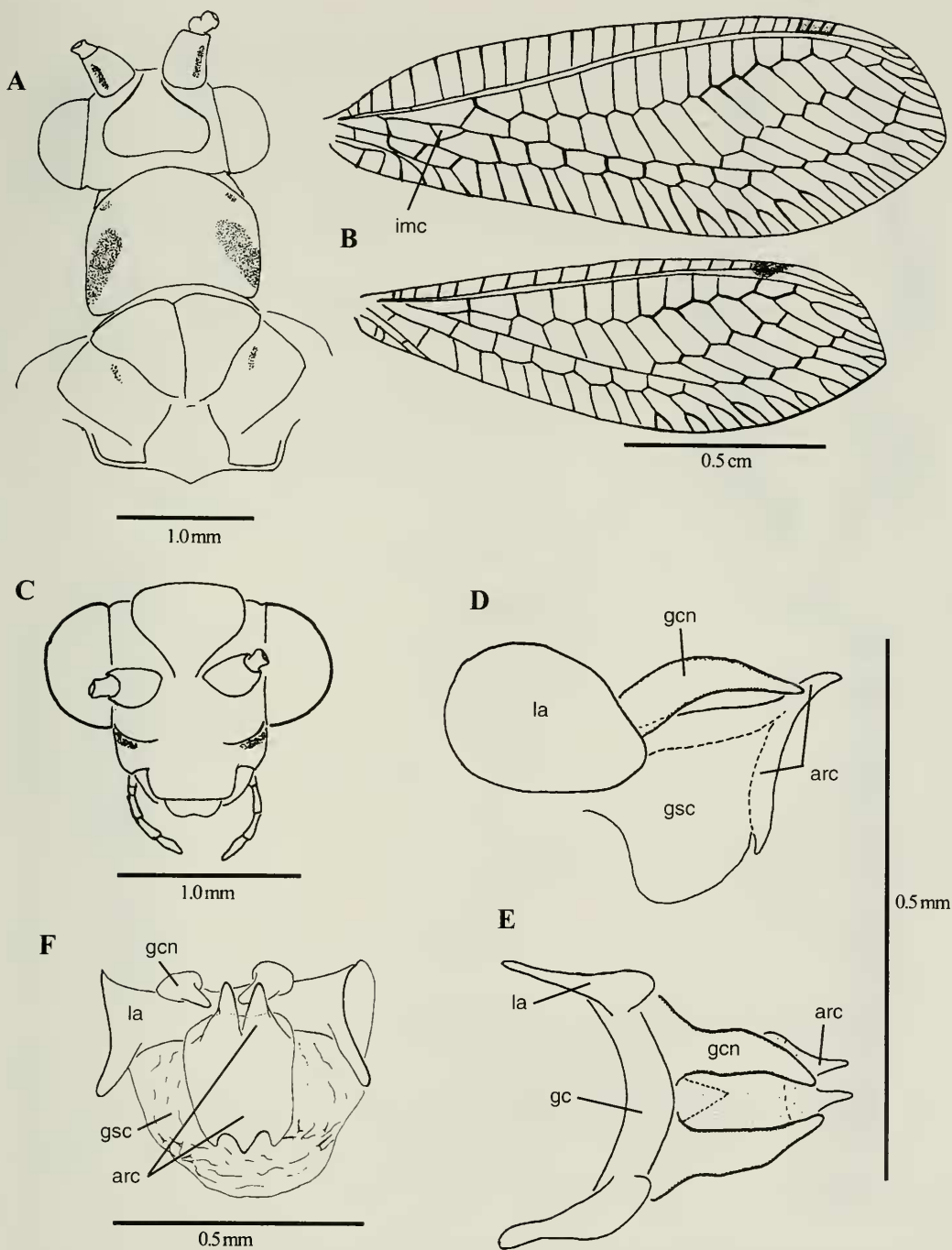


FIGURE 62. *Leucochrysa (Nodita) cornuta*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Male genitalia, lateral view; E. Male genitalia, dorsal view; F. Male genitalia, caudal view.

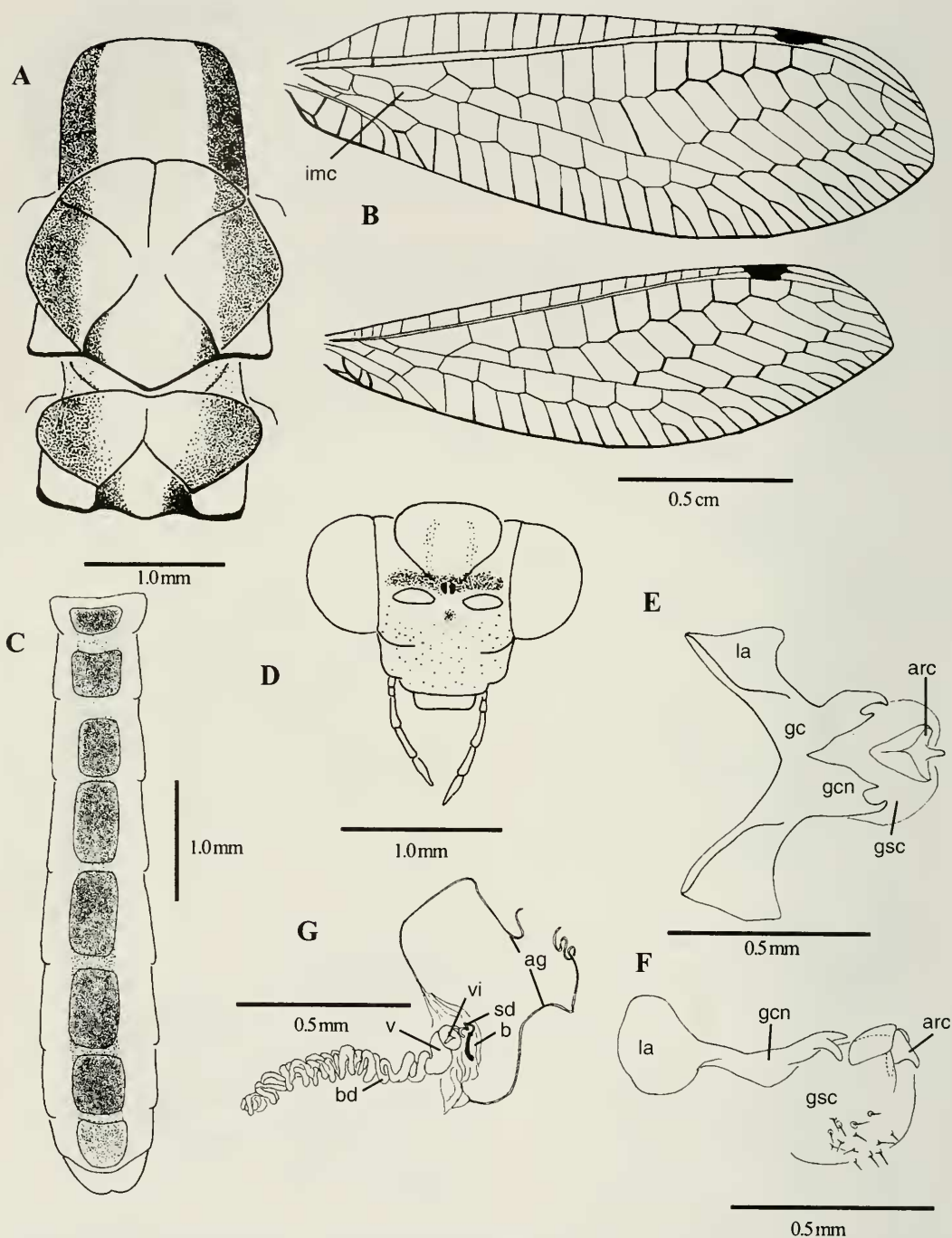


FIGURE 63. *Leucochrysa (Nodita) forciformis*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Female genitalia.

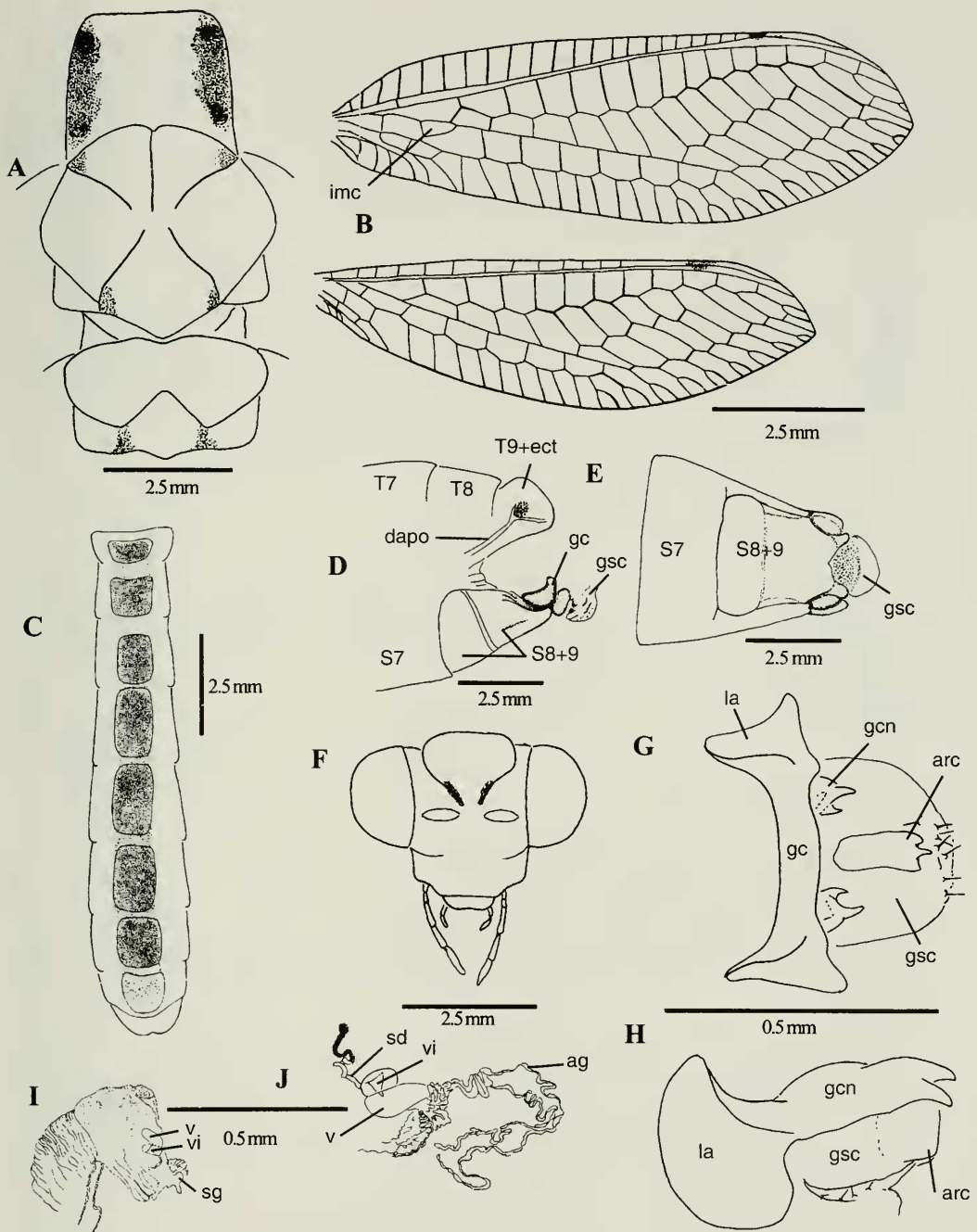


FIGURE 64. *Leucochrysa (Nodita) furcata*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Apex of male abdomen; E. Sternite 8 + 9; F. Head, frontal view; G. Male genitalia, dorsal view; H. Male genitalia, lateral view; I. Female genitalia; J. Spermatheca.

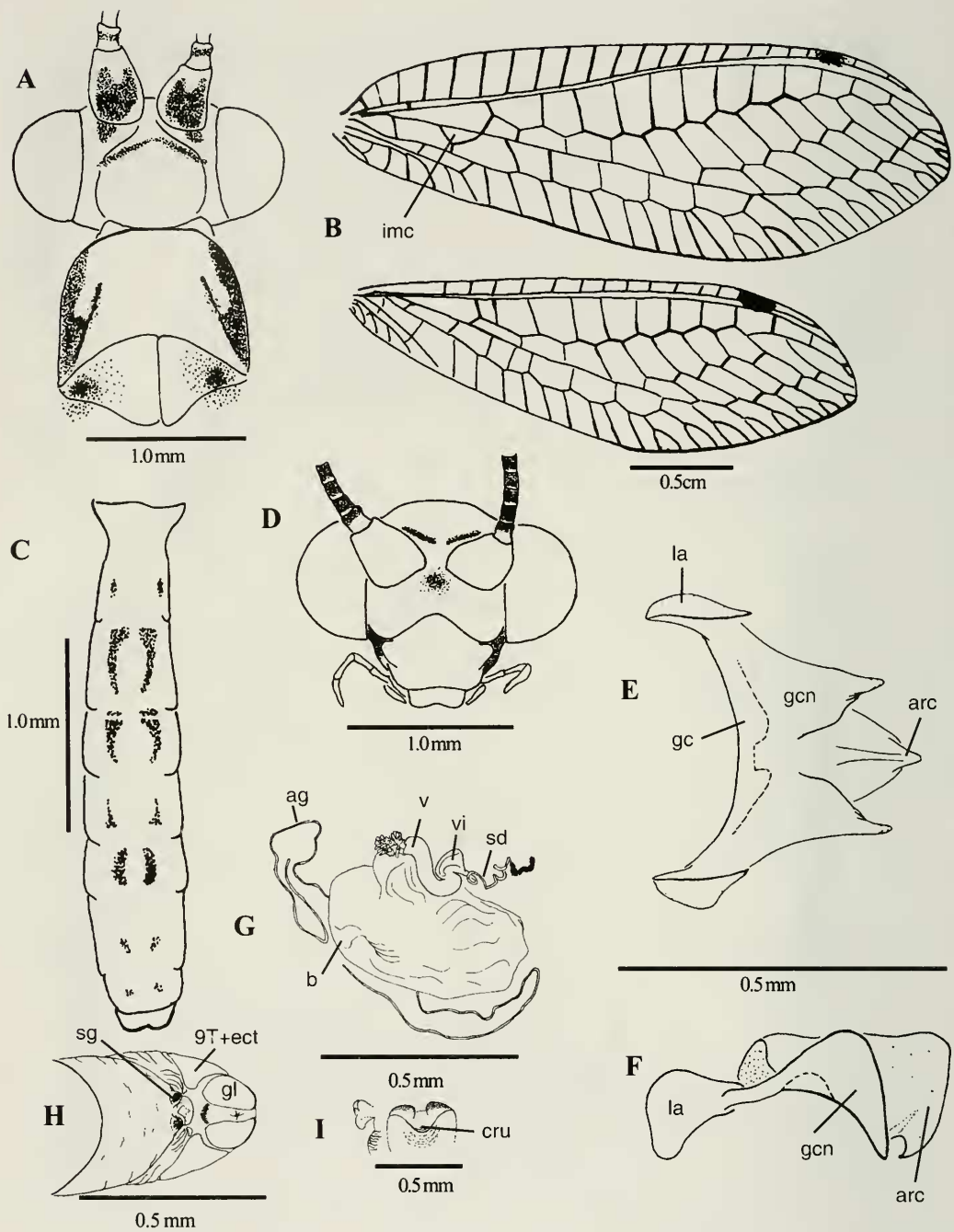


FIGURE 65. *Leucochrysa (Nodita) guataparensis*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings, C. Abdomen, dorsal view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Female genitalia; I. Subgenitale.

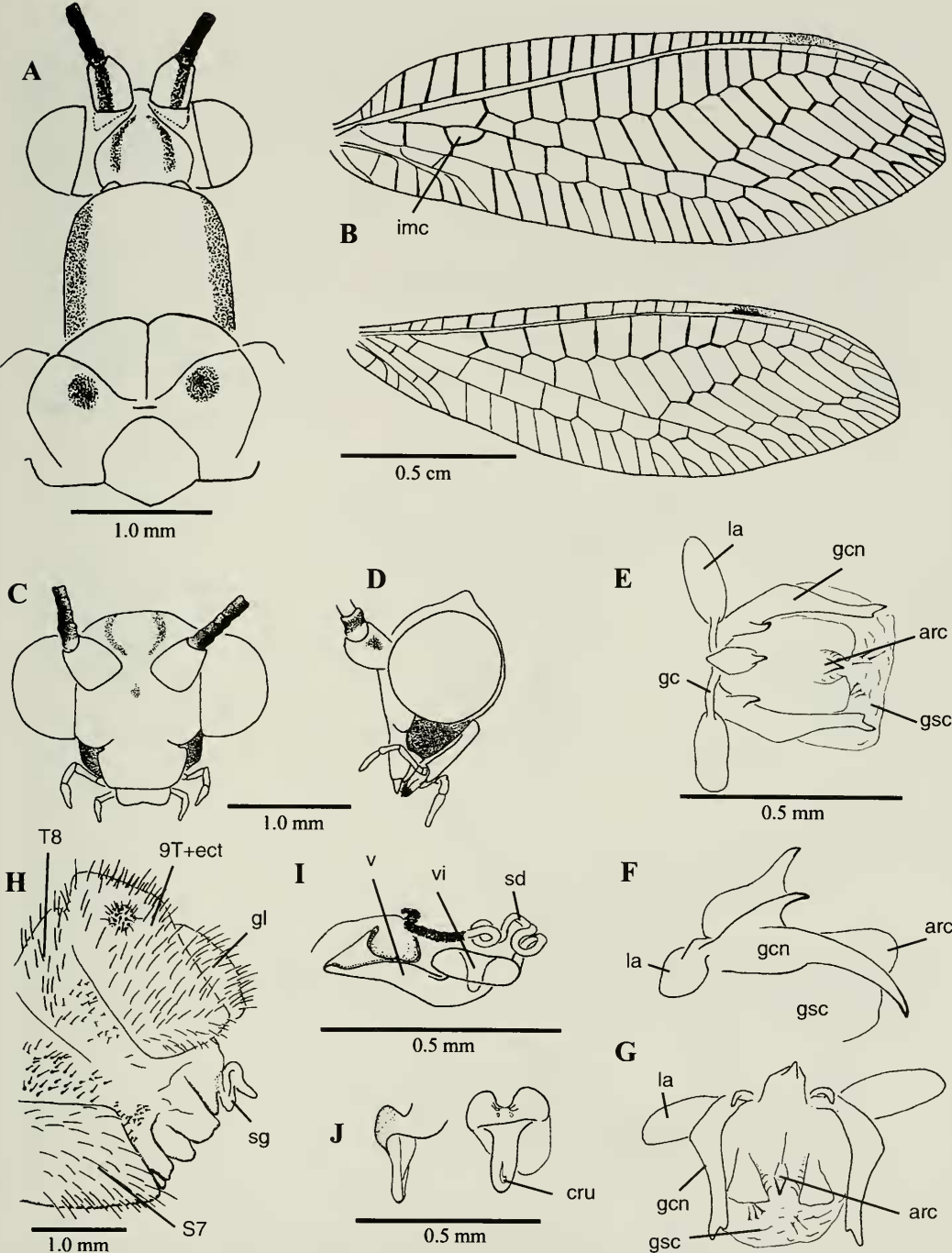


FIGURE 66. *Leucochrysa (Nodita) ictericus*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Head, frontal view; D. Head, lateral view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Male genitalia, caudal view; H. Apex of female abdomen, lateral view; I. Spermatheca; J. Subgenitale.

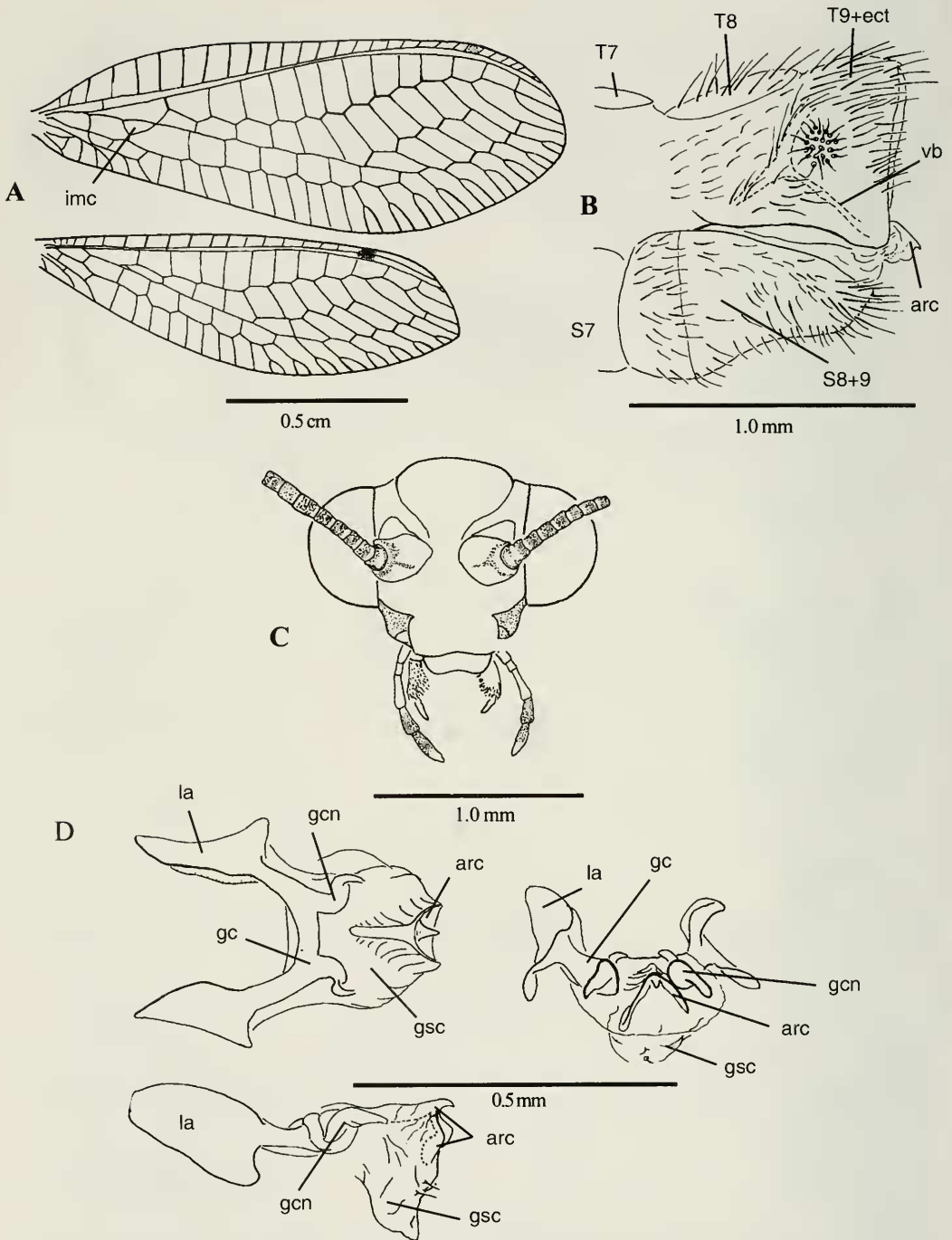


FIGURE 67. *Leucochrysa (Nodita) incognita*, new species A. Wings; B. Apex of male abdomen, lateral view; C. Head, frontal view; D. Male genitalia, dorsal, lateral and caudal view.

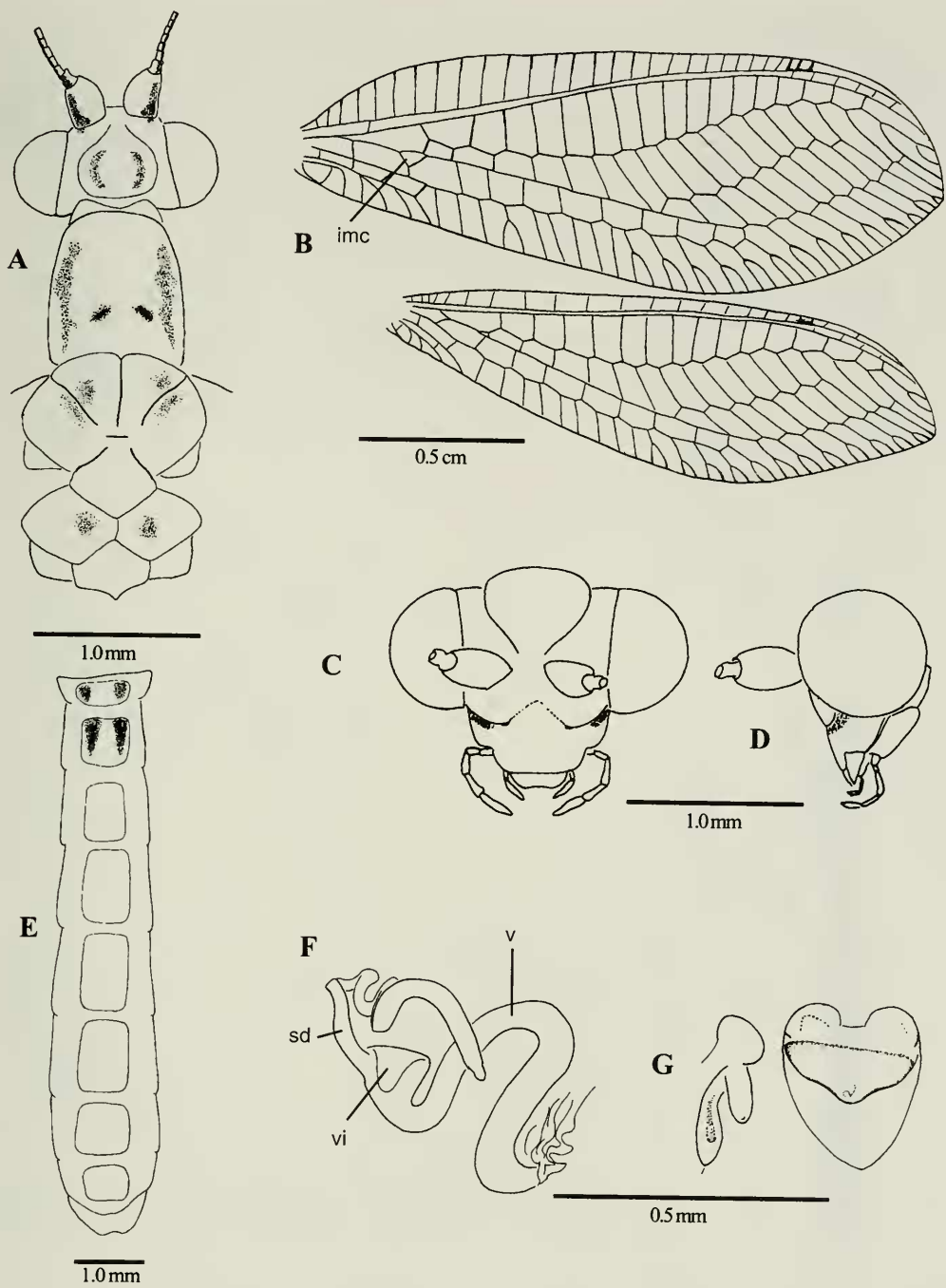


FIGURE 68. *Leucochrysa (Nodita) interata*, new species. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Head, frontal view; D. Head, lateral view; E. Abdomen, dorsal view; F. Spermatheca; G. Subgenital.

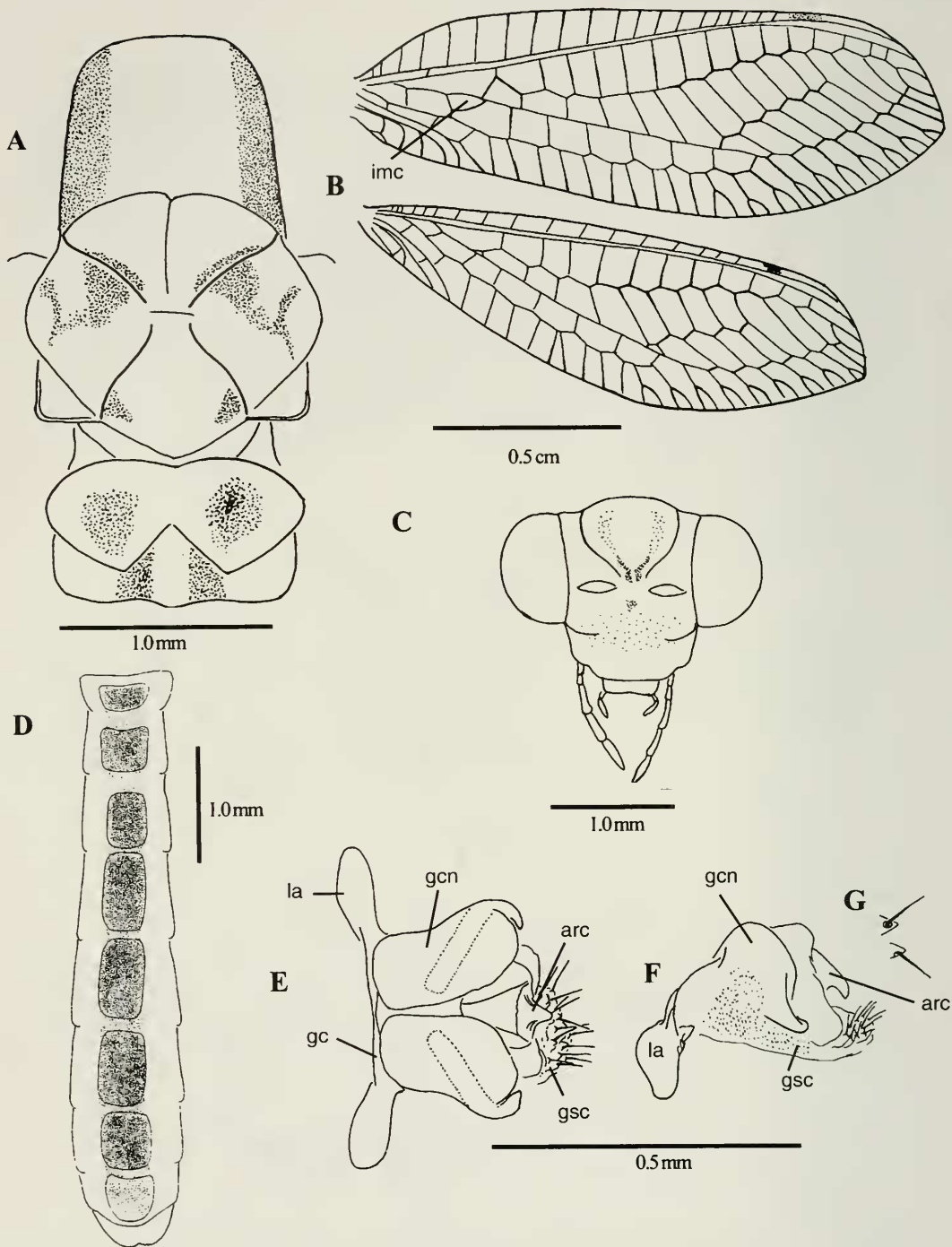


FIGURE 69. *Leucochrysa (Nodita) lineata*, new species. A. Pro-, meso- and metanota; B. Wings; C. Head, frontal view; D. Abdomen, dorsal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Gonosetae.

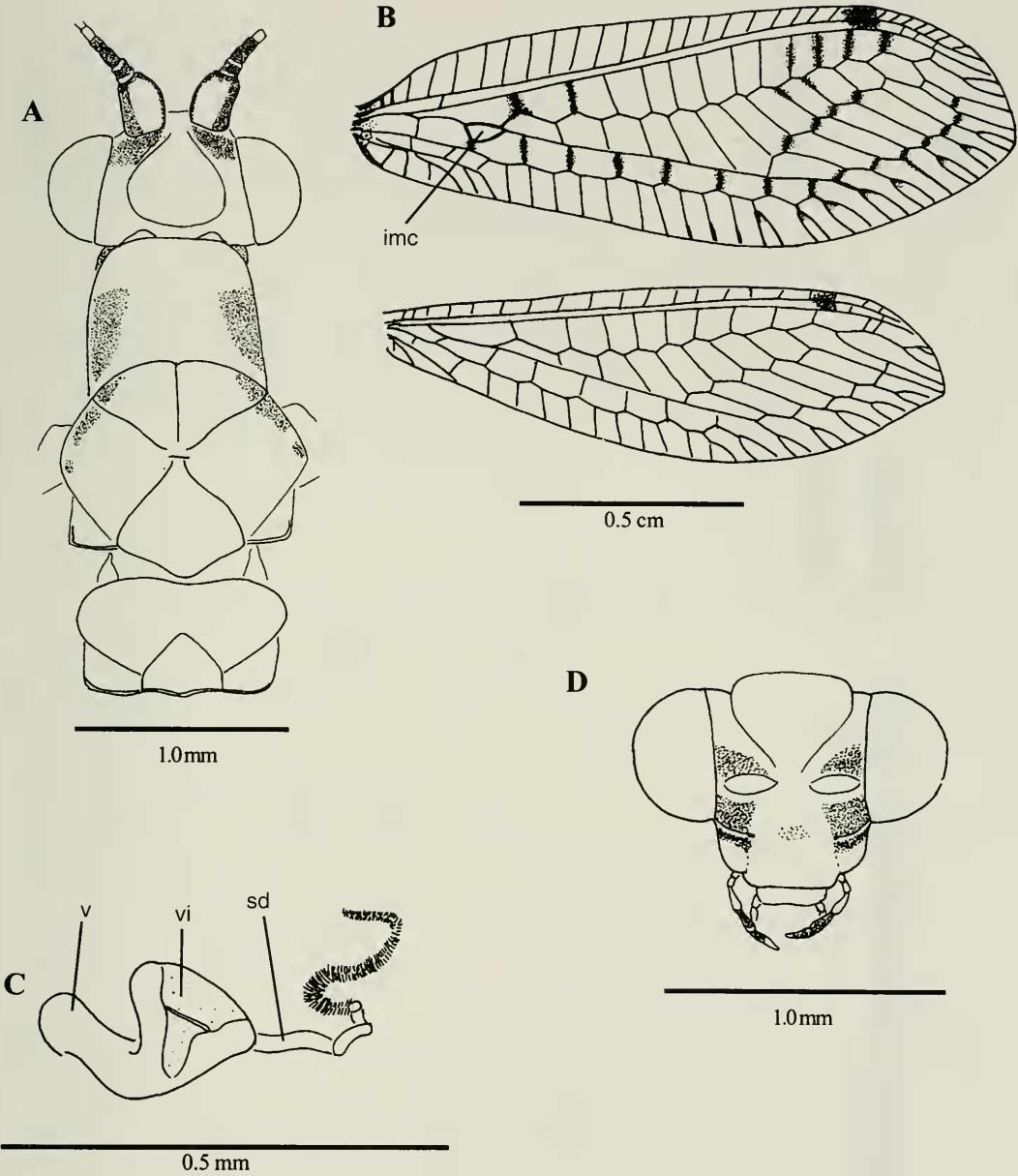


FIGURE 70. *Leucochrysa (Nodita) maculata* new species. A. Head and thorax, dorsal view; B. Wings; C. Spermatheca; D. Head, frontal view.

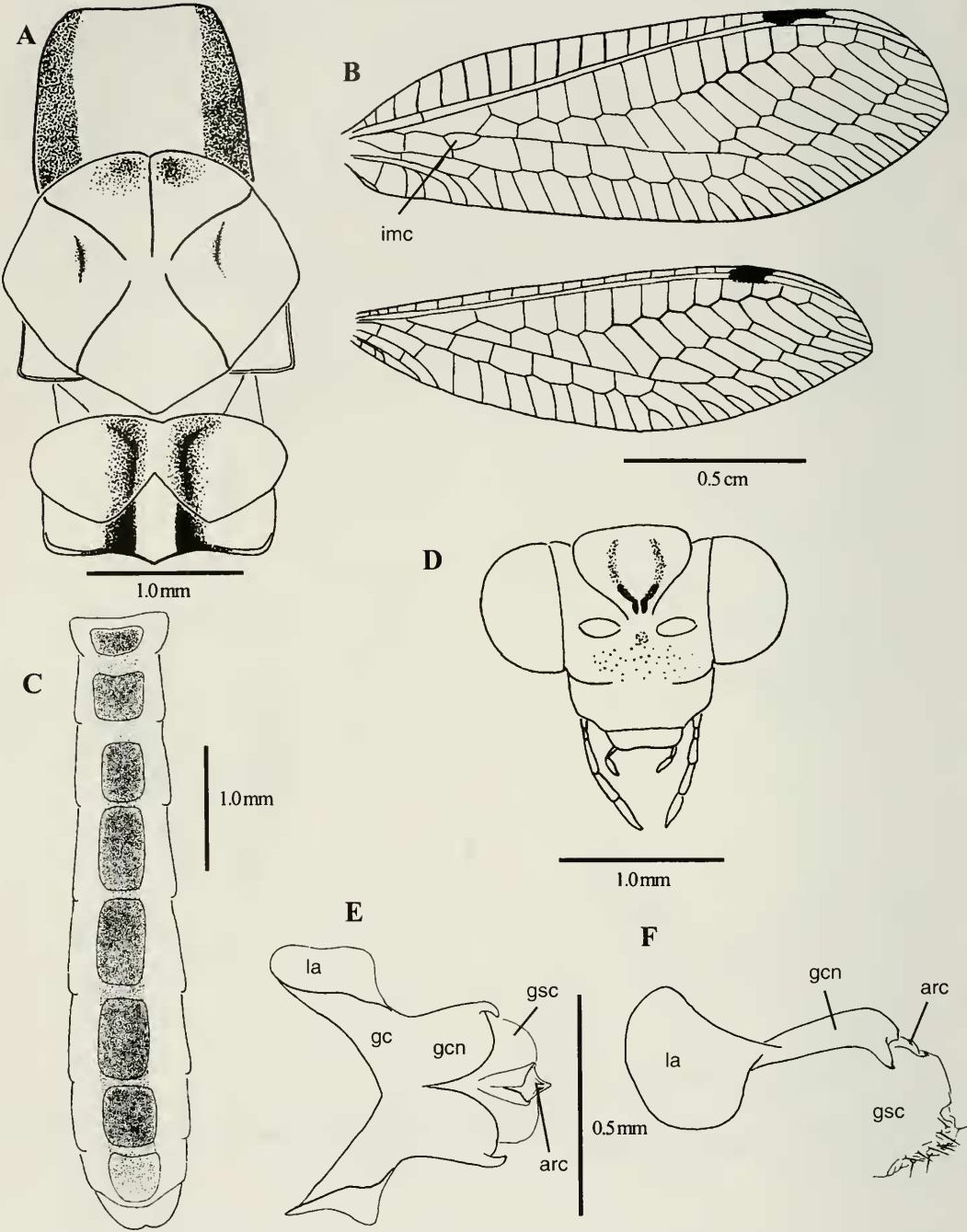


FIGURE 71. *Leucochrysa (Nodita) michelini*, new species. A. Thorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view.

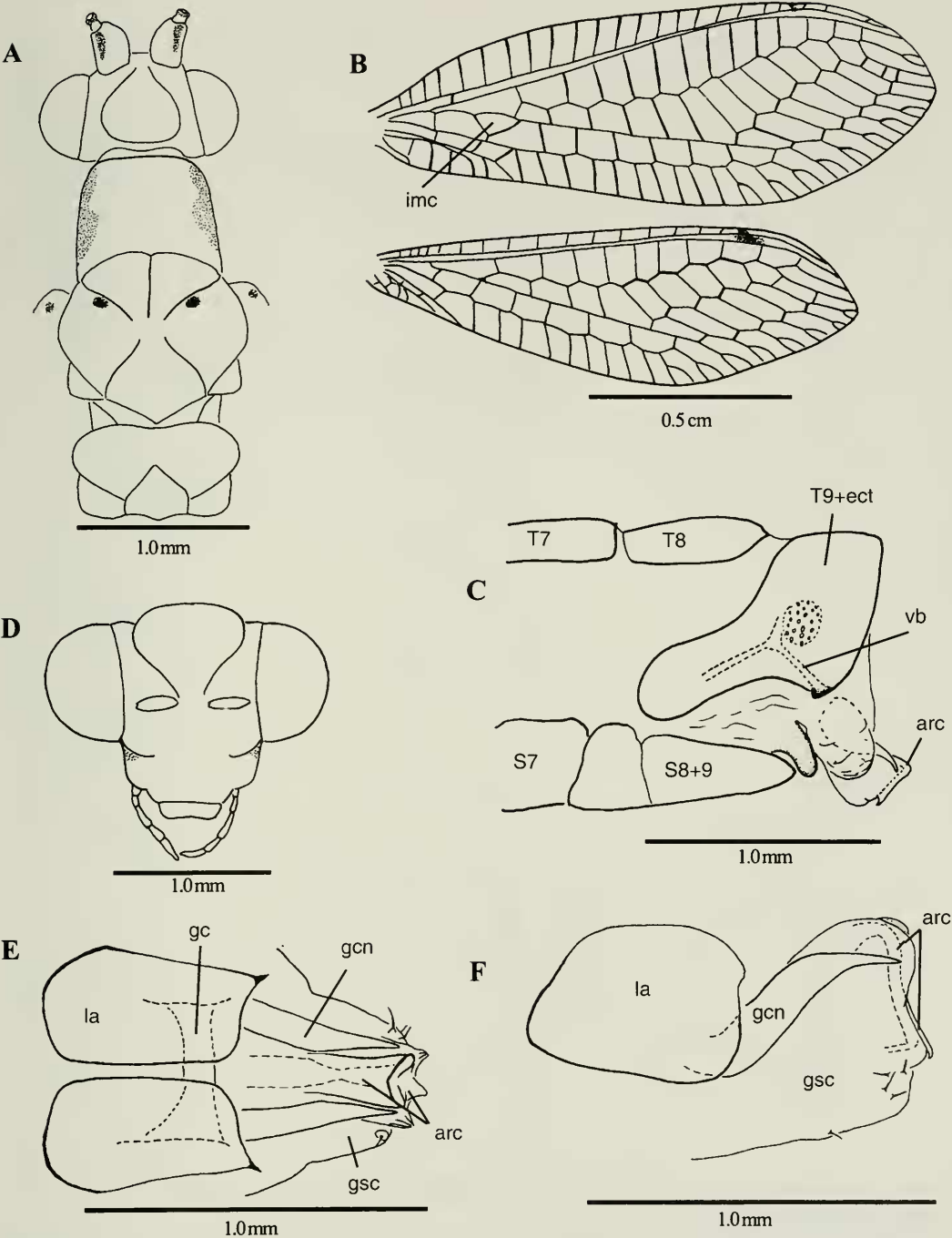


FIGURE 72. *Leucochrysa (Nodita) parallela* new species A. Head and thorax, dorsal view; B. Wings; C. Apex of male abdomen, lateral view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view.

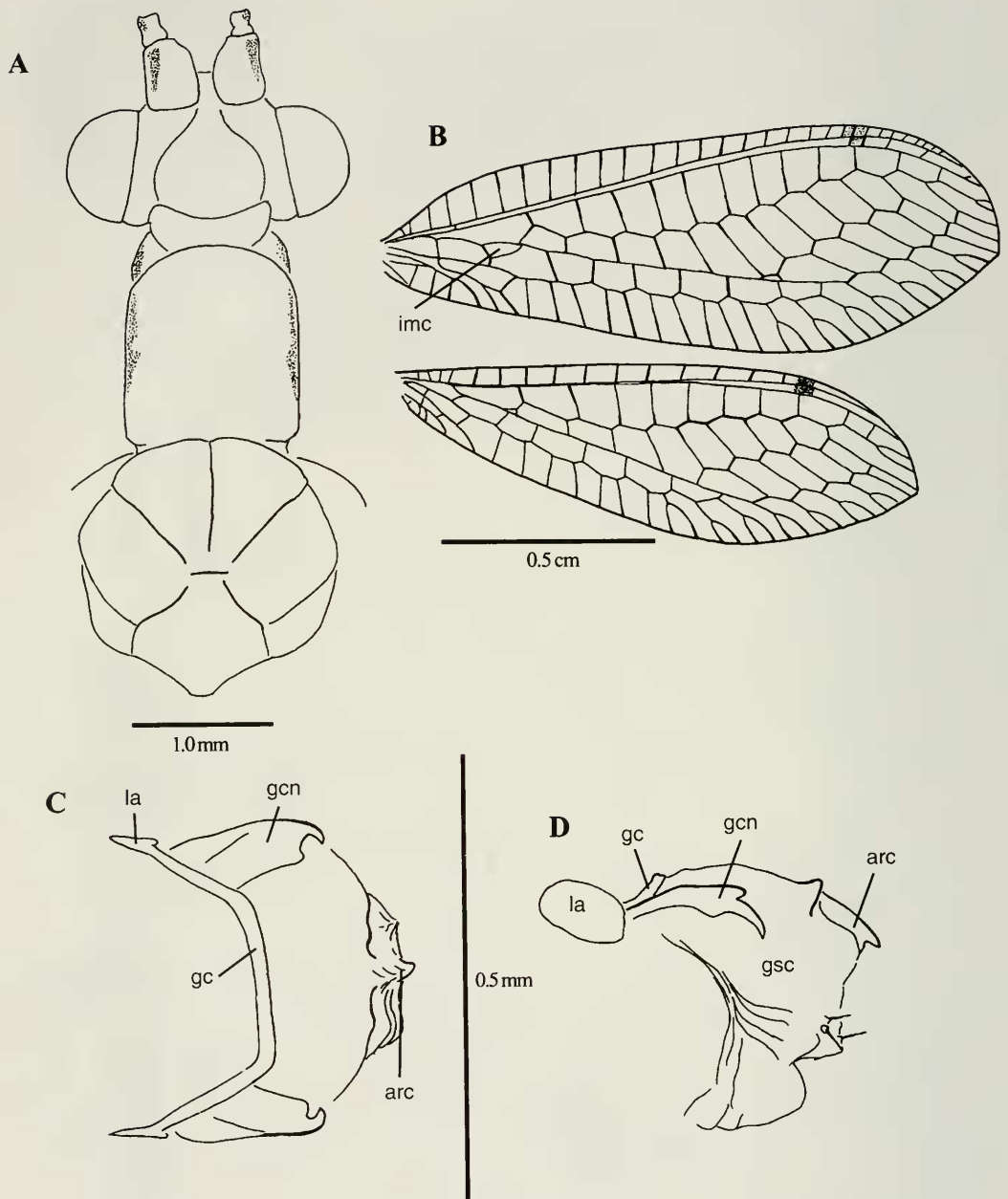


FIGURE 73. *Leucochrysa (Nodita) retusa*. A. Head, pro- and mesothorax, dorsal view; B. Wings; C. Male genitalia, dorsal view; D. Male genitalia, lateral view.

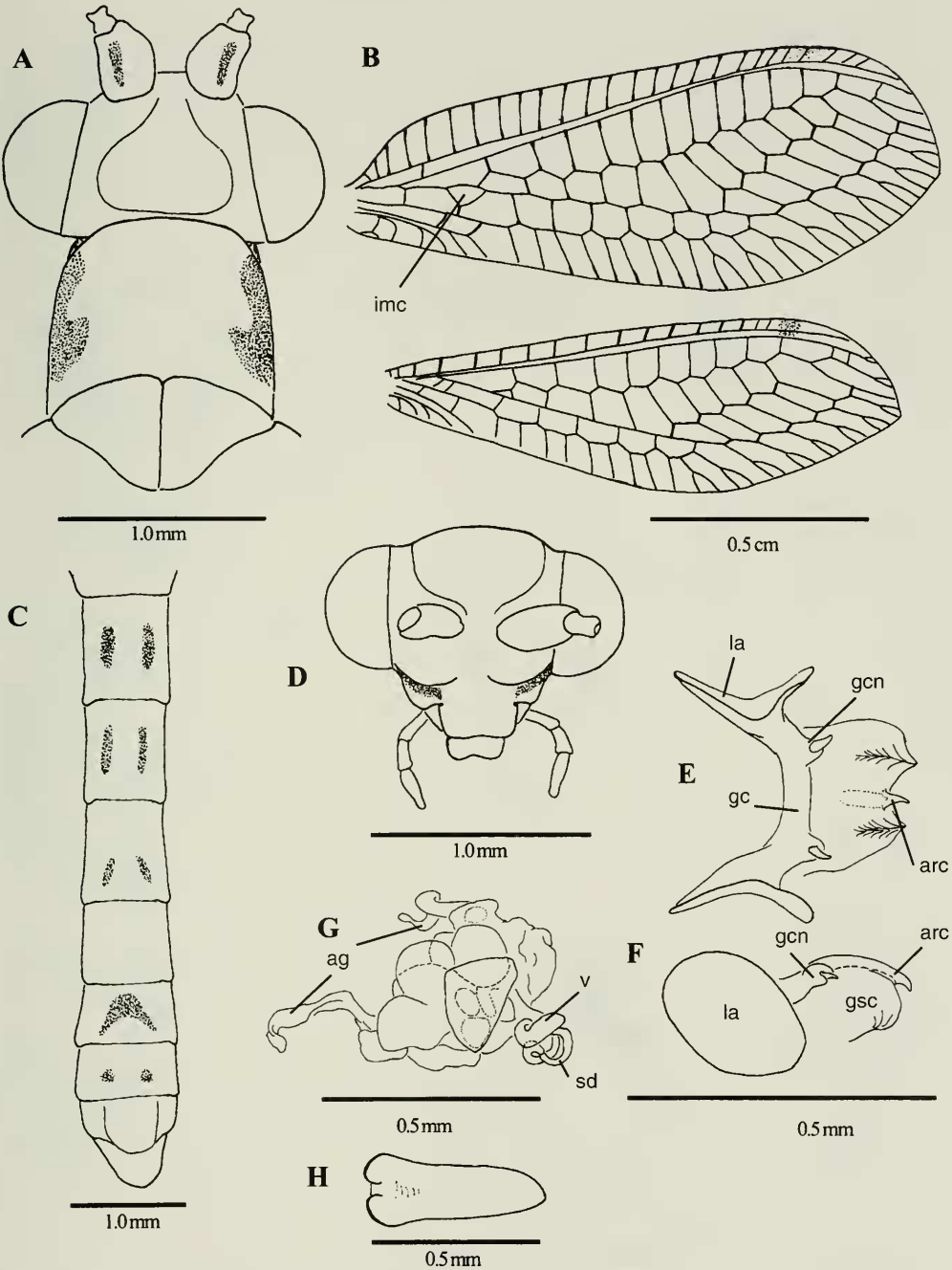


FIGURE 74. *Leucochrysa (Nodita) robusta*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Female genitalia; H. Subgenitale.

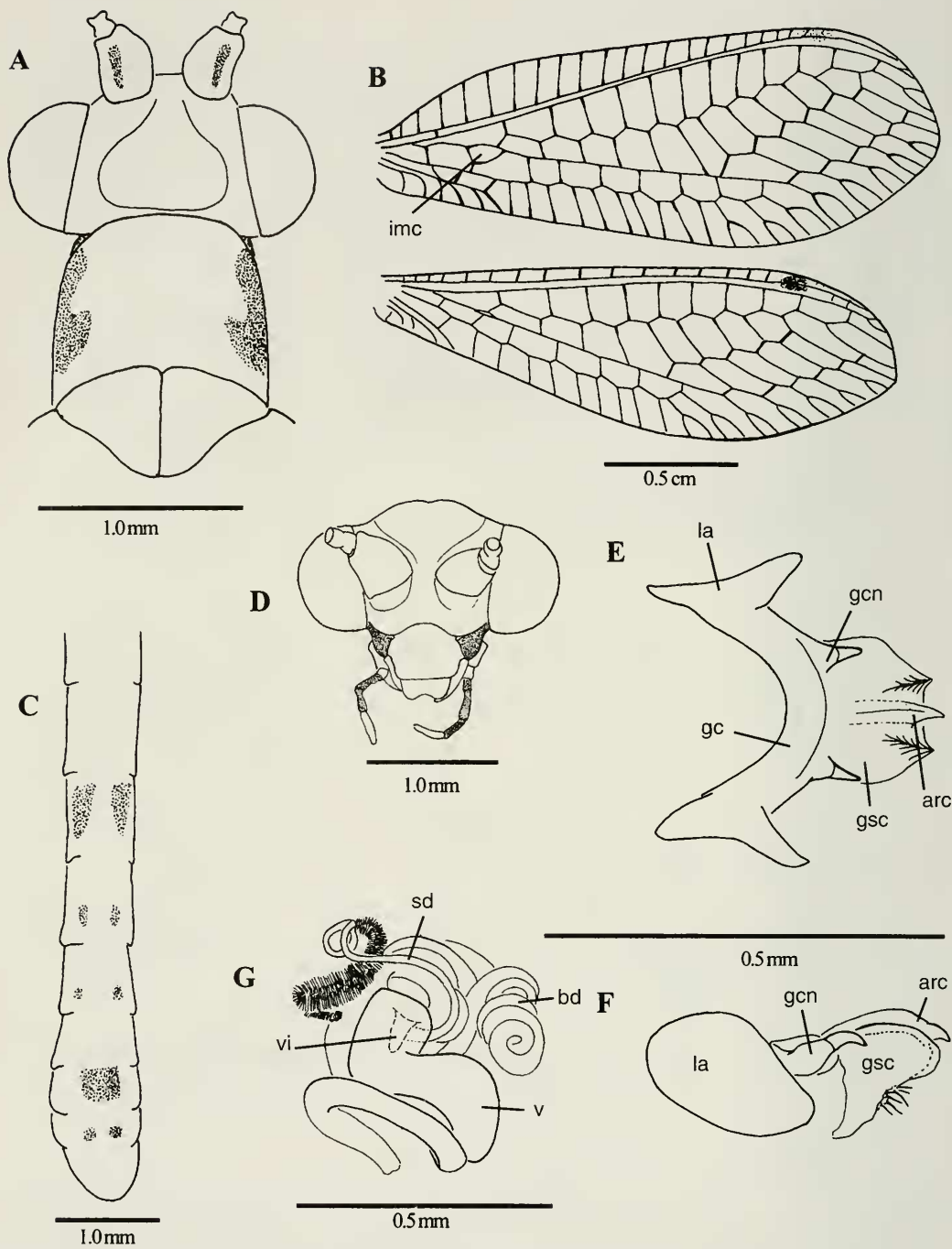


FIGURE 75. *Leucochrysa (Nodita) santni*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Subgenitale.

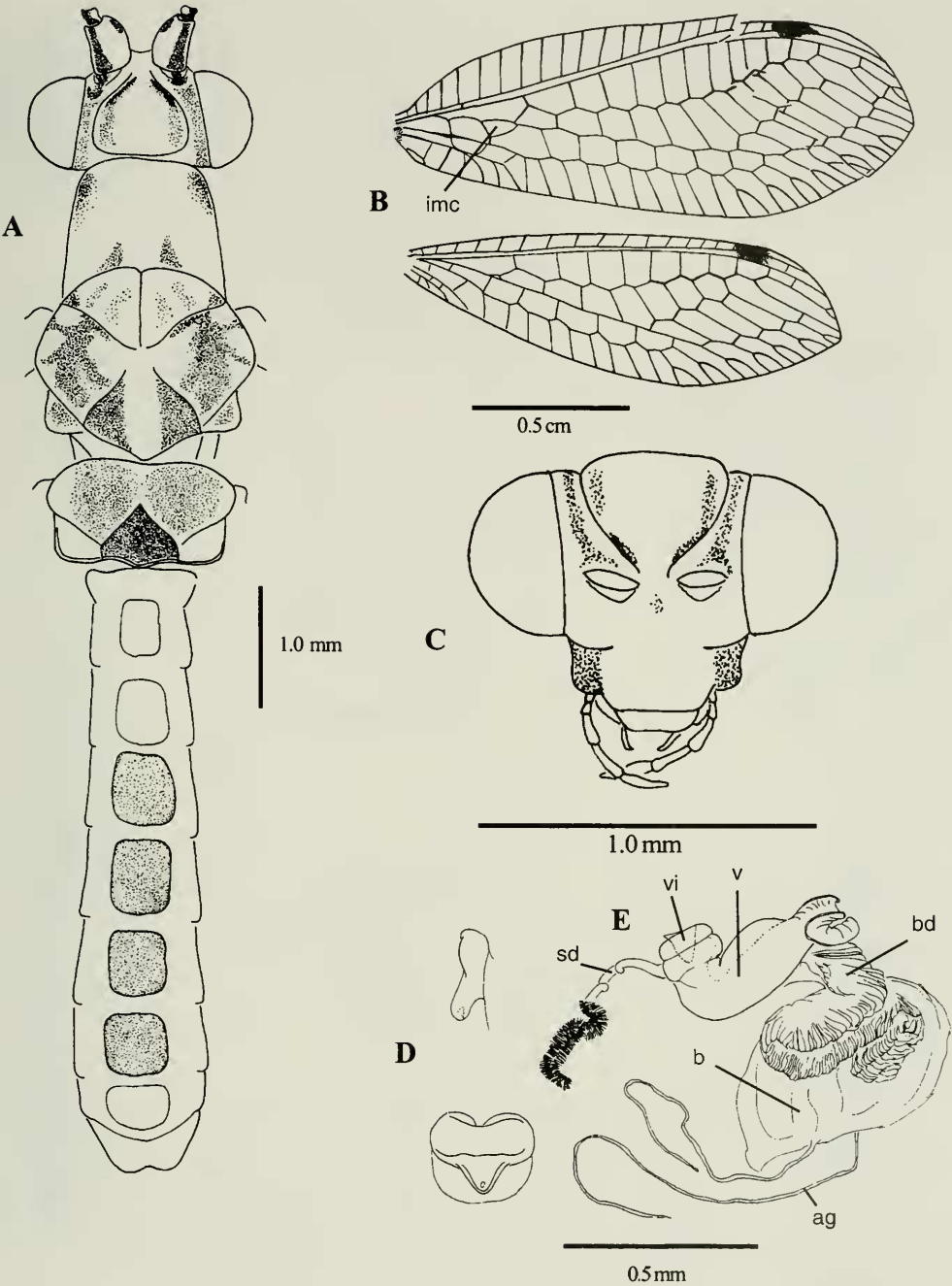


FIGURE 76. *Leucochrysa (Nodita) scomparini*, new species. A. Head and thorax, dorsal view; B. Wings; C. Head, frontal view; D. Subgenital; E. Female genitalia.

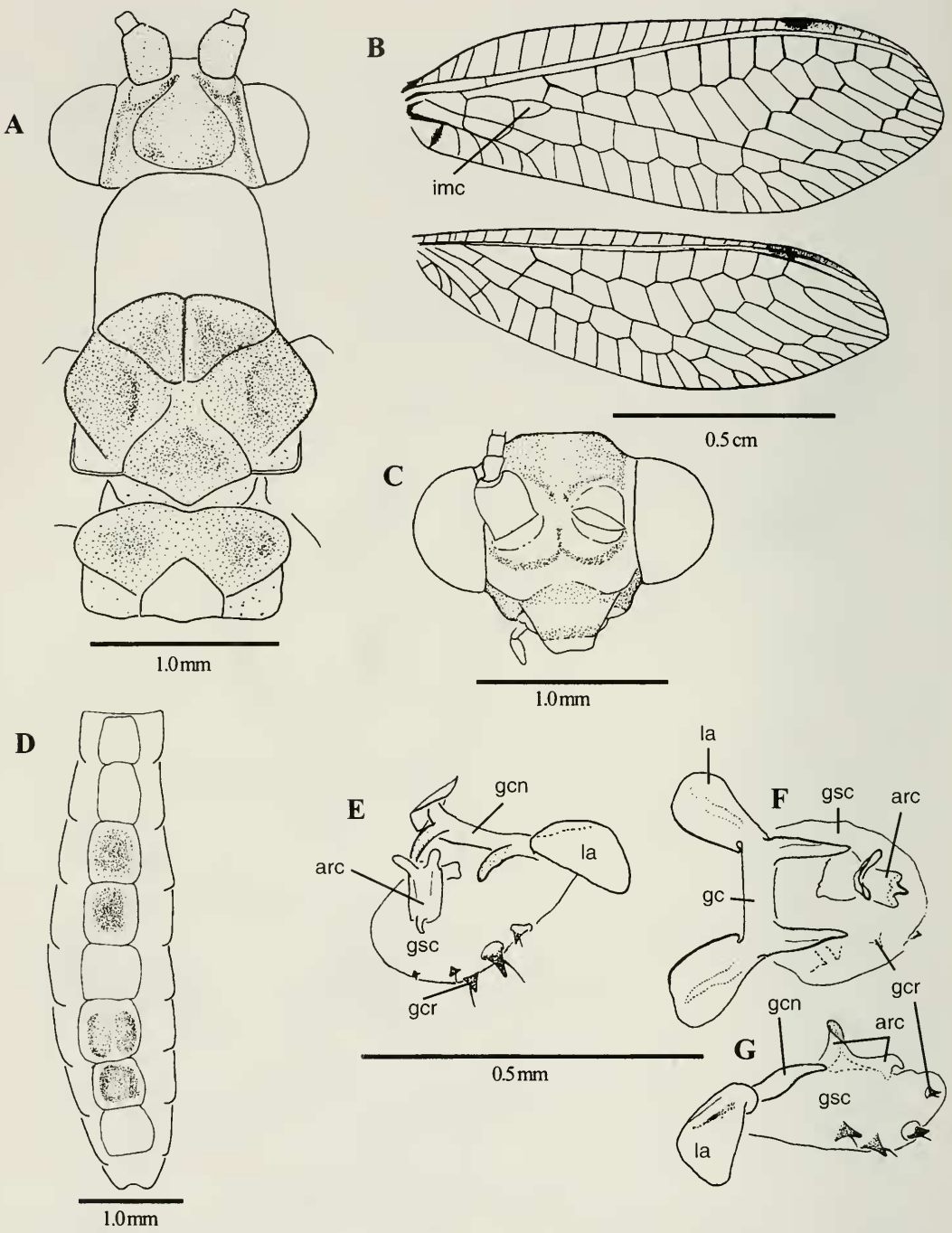


FIGURE 77. *Leucochrysa (Nodita) squamisetosa*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Abdomen, dorsal view; E. Male genitalia, dorso-caudal view; F. Male genitalia, dorsal view; G. Male genitalia, lateral view.

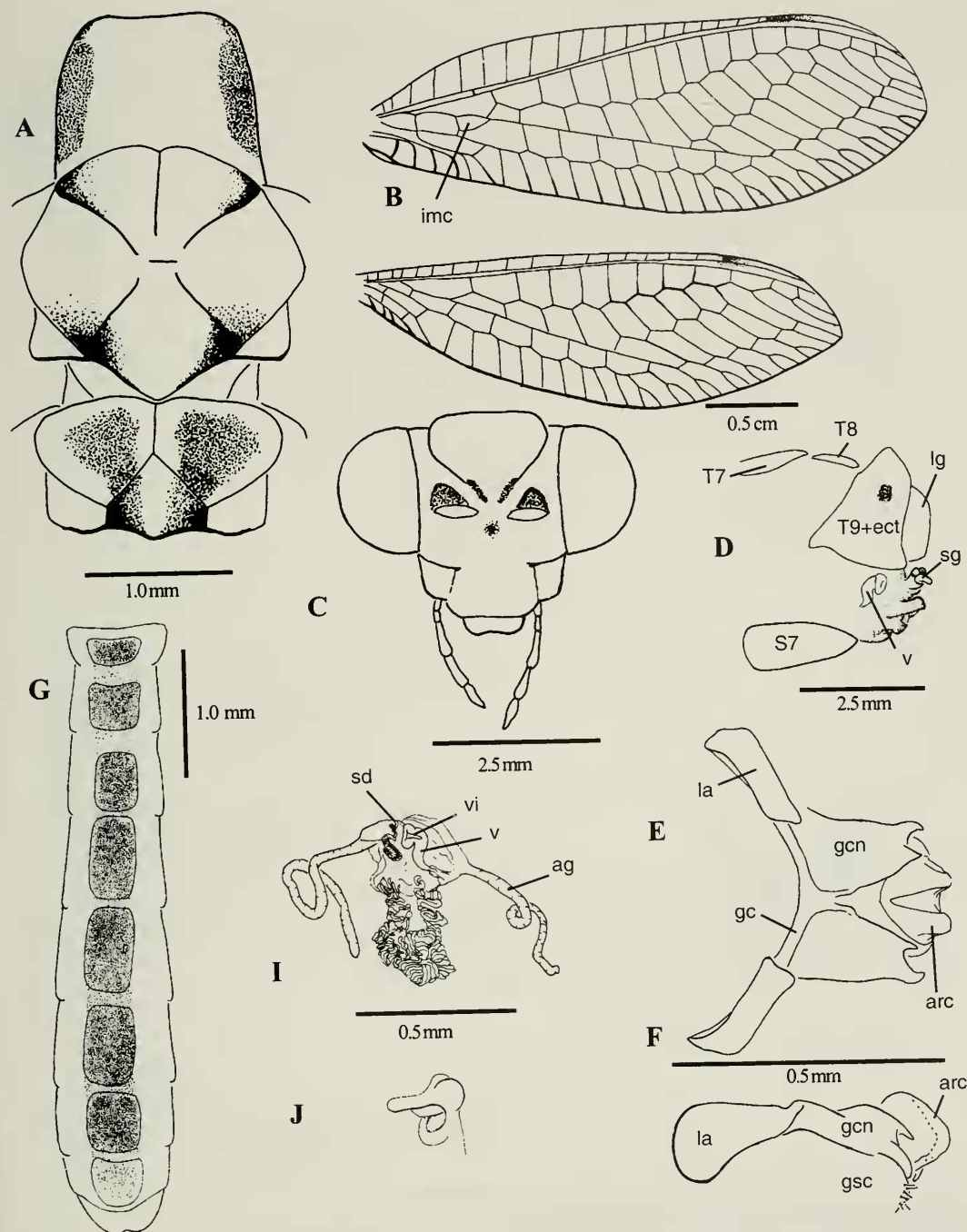


FIGURE 78. *Leucochrysa (Nodita) tabacinus*, new species A. Head and thorax, dorsal view; B. Wings; C. Head, frontal view; D. Apex of female abdomen, lateral view; E. Male genitalia, dorsal view; F. Male genitalia, lateral view; G. Abdomen, dorsal view; H. Female genitalia; I. Subgenitale.

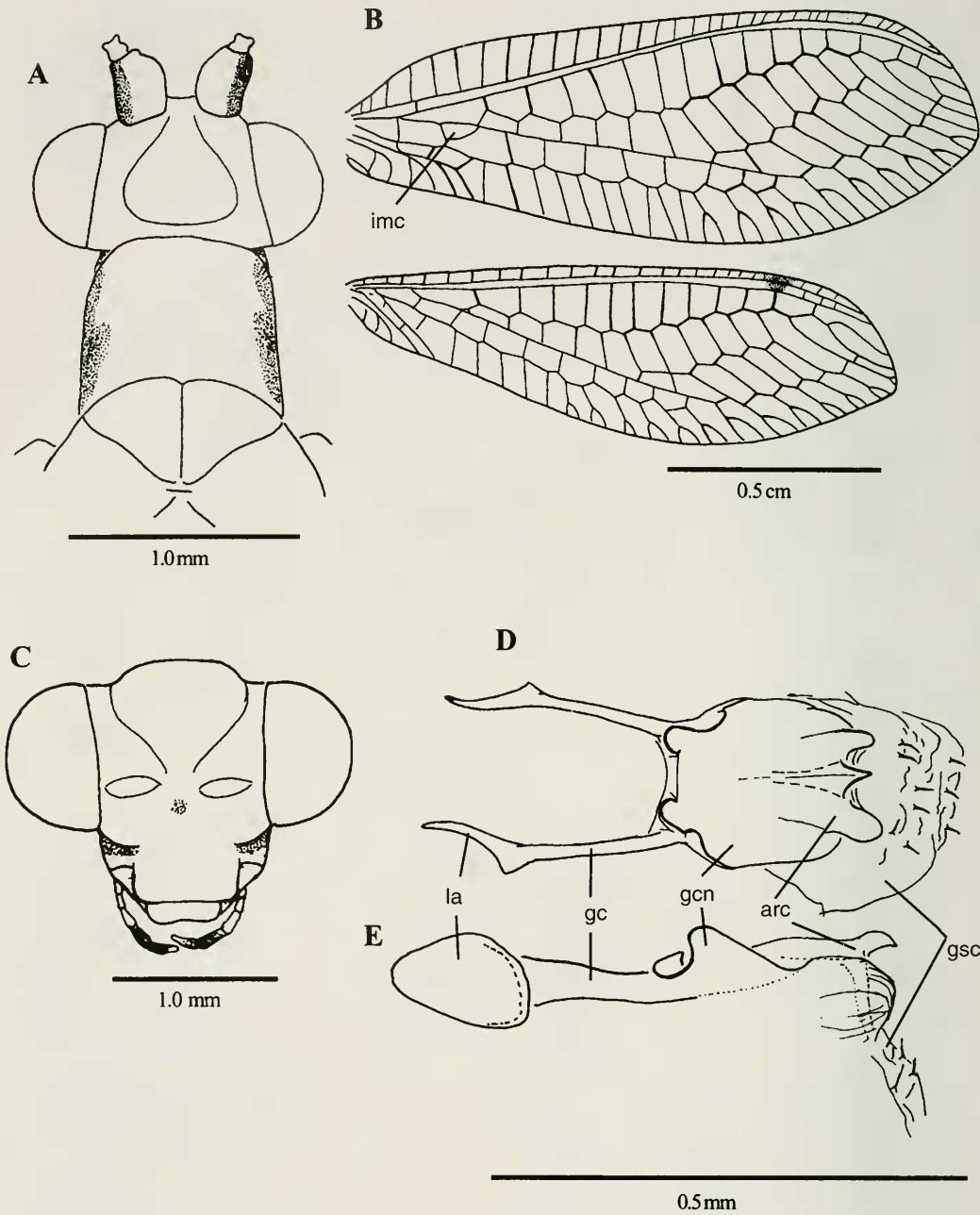


FIGURE 79. *Leucochrysa (Nodita) tenuis*, new species. A. Head and prothorax, dorsal view; B. Wings; C. Head, frontal view; D. Male genitalia, dorsal view; E. Male genitalia, lateral view.

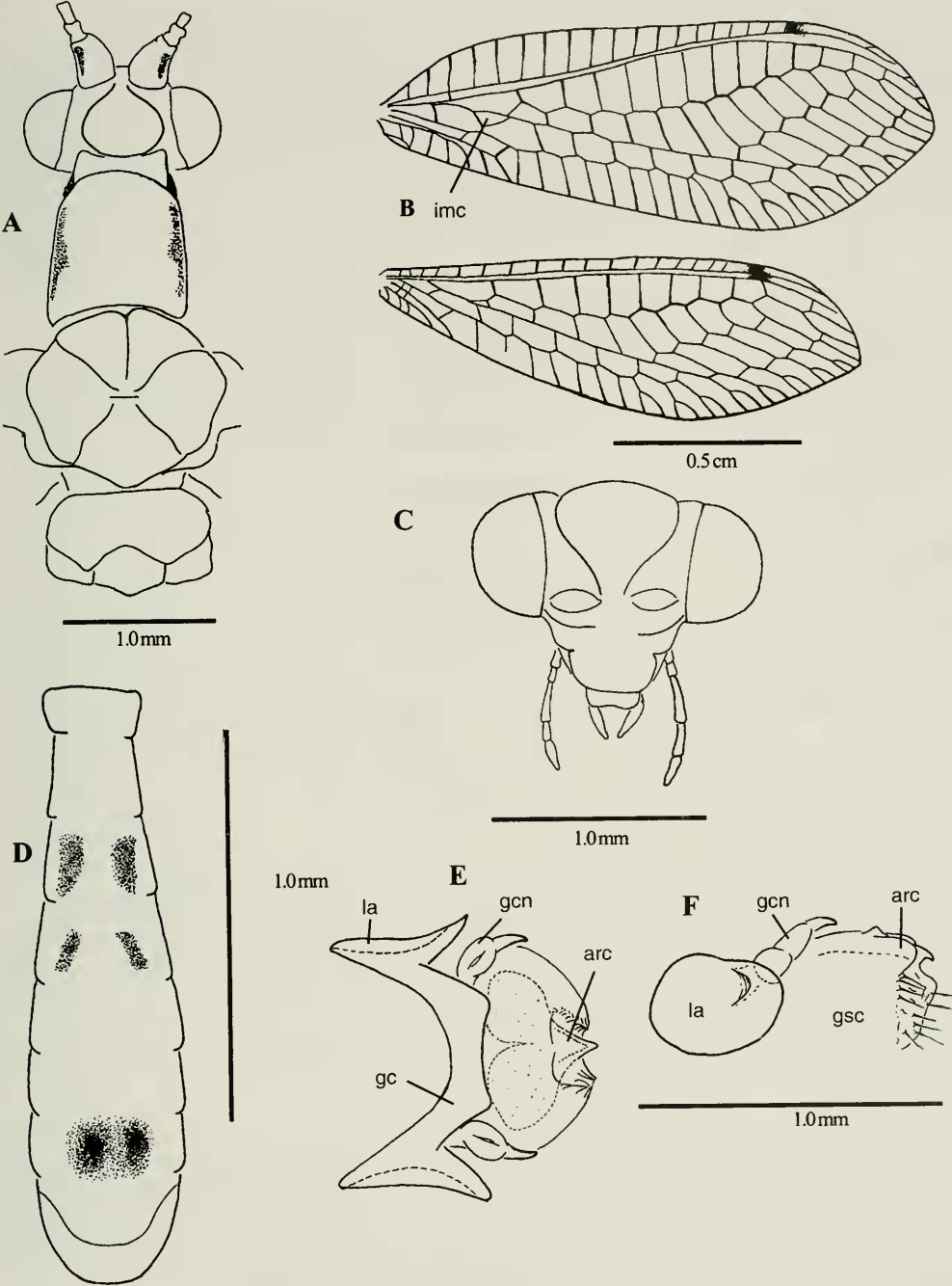


FIGURE 80. *Leucochrysa (Nodita) vignisi*, new species. A. Head and thorax, dorsal view; B. Wings; C. Head, frontal view; D., E. Male genitalia, dorsal view; F. Male genitalia, lateral view.

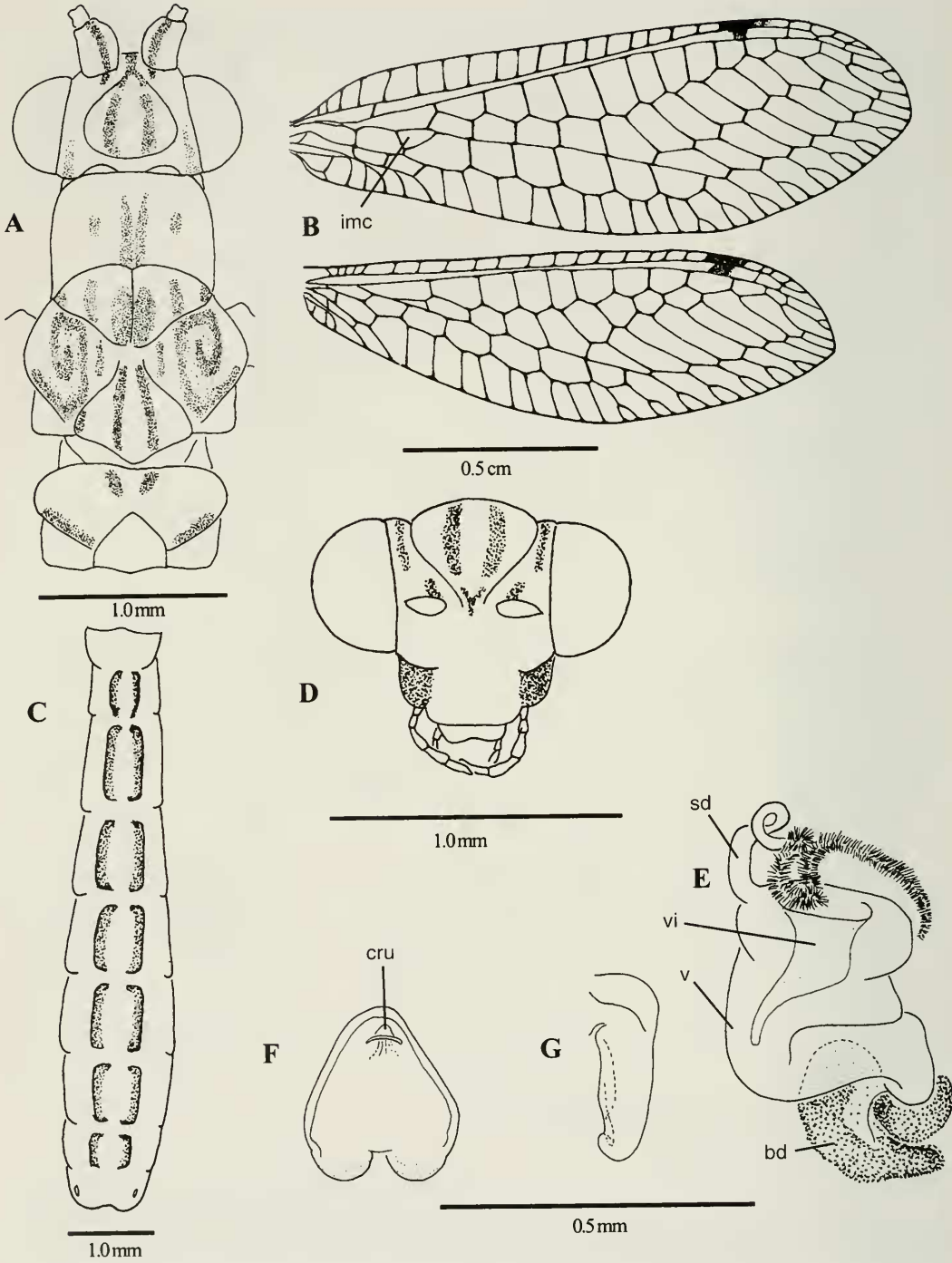


FIGURE 81. *Leucochrysa (Nodita) vittata*, new species. A. Head and thorax, dorsal view; B. Wings; C. Abdomen, dorsal view; D. Head, frontal view; E. Spermatheca; F. Subgenitale, dorsal view; G. Subgenitale, lateral view.

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LITERATURE CITED

- ADAMS, P. A. 1977. Taxonomy of United States *Leucochrysa* (Neuroptera: Chrysopidae). *Psyche*, Camb. 84(1):92–102.
- . 1978. Zoogeography of New World Chrysopidae, a progress report. *Folia Entomologica Mexicana* 39/40:210–211.
- . 1982a. *Ceraeochrysa*, a new genus of Chrysopinae (Neuroptera) (Studies in New World Chrysopidae, Part II). *Neuroptera International* 2:69–75, 12 figs.
- . 1982b. *Plesiochrysa*, a new subgenus of *Chrysopa* (Neuroptera) (Studies in New World Chrysopidae, Part I). *Neuroptera International* 2:27–32, 13 figs.
- ADAMS, P. A. AND N. D. PENNY. 1987. Neuroptera of the Amazon Basin. Part 11a. Introduction and Chrysopini. *Acta Amazônica* 15:413–479. 213 + 29 figs., 1 table.
- BANKS, N. 1910. New South American neuropteroid insects. *Proceedings of the Entomological Society of Washington* 12:146–160.
- . 1915. New neuropteroid insects, native and exotic. *Proceedings of the Academy of Natural Sciences of Philadelphia* 66:608–632, 1 pl. with 26 figs.
- . 1918. New neuropteroid insects. *Bulletin of the Museum of Comparative Zoology* 62:1–22, 2 pls. with 26 figs.
- . 1920. New neuropteroid insects. *Bulletin of the Museum of Comparative Zoology* 64:297–362, 7 pls. with 110 figs.
- . 1944. Neuroptera of northern South America. Part III. Chrysopidae. *Boletín de Entomología Venezolana* 3:1–34.
- . 1945. A review of the Chrysopidae (Nothochrysidae) of Central America. *Psyche*, Camb. 52:139–174.
- . 1948. Chrysopidae (Nothochrysidae) collected in Mexico by Dr. A. Dampf (Neuroptera). *Psyche*, Camb. 55:151–177, 3 pls. with 37 figs.
- BROOKS, S. J. 1994. A taxonomic review of the common green lacewing genus *Chrysoperla* (Neuroptera: Chrysopidae). *Bulletin of the British Museum of Natural History, Entomology Series* 63(2):137–210.
- BROOKS, S. J. AND P. C. BARNARD. 1990. The green lacewings of the world: a generic review (Neuroptera: Chrysopidae). *Bulletin of the British Museum of Natural History, Entomology Series* 59:117–286, 578 figs., 1 table.
- GERSTAECKER, A. 1888. Weitere Beiträge zur artenkenntniss der Neuroptera Megaloptera. *Mitteilungen des Naturwissenschaftlichen Vereins für Neu-Vorpommern und Rugen in Greifswald* 19:89–130.
- HAGEN, H. 1861. Synopsis of the Neuroptera of North America, with a list of the South American species. *Smithsonian Miscellaneous Collections* 49(1):xx + 1–347.
- KIMMINS, D. E. 1940. Notes on some types of Chrysopidae (Neuroptera) in the British Museum Collections. *Annals and Magazine of Natural History* (11)5:442–449.
- LÓPEZ-ARROYO, J. I., C. A. TAUBER AND M. J. TAUBER. 1999. Comparative life-histories of the predators *Ceraeochrysa cincta*, *C. cubana*, and *C. smithi* (Neuroptera: Chrysopidae). *Annals of the Entomological Society of America* 92:208–217.
- MATSUDA, M. 1928. Observations on *Chrysopa vulgaris* Schn. var. *ampingensis*, Petersen. *Transactions of the Natural History Society of Formosa* 18:97–114. [in Japanese]

- MCLACHLAN, R. 1868. New genera and species, &c., of neuropterous insects; and a revision of Mr. F. Walker's British Museum Catalogue of Neuroptera, part ii. (1853), as far as the end of the genus *Myrmeleon*. Journal of the Linnean Society of London, Zoology 9:230–281, 1 pl. with 3 figs.
- MINISTERIO DE AGRICULTURA. 1999. www.minagric.br.
- NAVÁS, L. 1911. *Chrysopides nouveaux* (Ins. Neur.). Annales de la Société Scientifique de Bruxelles 35 (pt. 2):266–282, 7 figs.
- . 1913a. Crisópidos sudamericanos. Brotéria (Zoológica) 11:73–104, 149–168. 8 and 5 figs.
- . 1913b. Névroptères nouveaux de l'Amérique du Nord [1]. Entomologische Zeitschrift, Frankfurt am Main 27:19–20, 2 figs.
- . 1913c. Les Chrysopides (Ins. Névr.) du Musée de Londres [1a]. Annales de la Société Scientifique de Bruxelles 37 (pt. 2):292–330, 19 figs.
- . 1914. Les Chrysopides (Ins. Névr.) du Musée de Londres [1b]. Annales de la Société Scientifique de Bruxelles 38 (pt. 2):73–114, 15 figs.
- . 1915. Neurópteros nuevos o poco conocidos. (Sexta [VI] serie). Memorias de la real Academia de Ciencias y Artes de Barcelona (3)12:119–136, 9 figs.
- . 1916. Neurópteros sudamericanos. (Tercera [III] serie). Neurópteros del Brasil recogidos por el R. P. Joaquín da Silva Tavares S. J. Brotéria (Zoológica) 14:14–35, 15 figs.
- . 1919. Algunos insectos Neurópteros de la República Argentina. (Tercera [III] serie). Revista de la Real Academia de Ciencias Exactas Físicas y Naturales de Madrid 17:287–305, 6 figs.
- . 1920. Insectos Sudamericanos (3a serie). Anales de la Sociedad Científica Argentina 90:52–72, 11 figs.
- . 1924a. Insectos de la Argentina y Chile. Estudios. Revista Mensual (Academia literaria del Plata, Buenos Aires) 22:358–368. 4 figs.
- . 1924b. Crisópidos (Neur.) de Cuba. Boletín de la Sociedad Entomologica de España 7:51–53.
- . 1926. Algunos insectos del Brasil (3.a serie) [IIIb]. Brotéria (Zoológica) 23:5–15, 5 figs.
- . 1930. Insectos de la Argentina. (Sexta [VI] serie). Revista de la Sociedad Entomologica Argentina 3:125–132, 5 figs.
- . 1933. Insectos suramericanos. (Sexta [VI] serie). Revista de la Real Academia de Ciencias Exactas Físicas y Naturales de Madrid 29:191–198, 7 figs.
- NEUMARK, A. 1952. *Chrysopa carnea* Steph. and its enemies in Israel. Forest Research Station, Ilanot 1:vii + 1–127, 68 figs.
- PENNY, N. D. 1978. Lista de Megaloptera, Neuroptera e Raphidioptera do México, América Central, ilhas Caraíbas e América do Sul. Acta Amazônica 7(4)(Suplemento):1–61.
- . 1997. Four new species of Costa Rican *Ceraeochrysa* (Neuroptera: Chrysopidae). Pan-Pacific Entomologist 73(2):61–69.
- . 1998. New Chrysopinae from Costa Rica (Neuroptera: Chrysopidae). Journal of Neuropterology 1:55–78. 68 figs.
- . 2001. New species of Chrysopinae (Neuroptera: Chrysopidae) from Costa Rica, with selected taxonomic notes and a neotype designation. Entomological News 112(1):1–14.
- PENNY, N. D., P. A. ADAMS, AND L. A. STANGE. 1997. Species catalog of the Neuroptera, Megaloptera, and Raphidioptera of America north of Mexico. Proceedings of the California Academy of Sciences 50(3):39–114.
- SCHNEIDER, W. G. 1851. Symbolae ad monographiam generis Chrysopae, Leach. Hirt, Vratislaviae. 178 pp., 60 pls.
- SMITH, R. C. 1921. A study of the biology of the Chrysopidae. Annals of the Entomological Society of America 14:27–35.
- . 1922. The biology of the Chrysopidae. Memoirs of the Cornell University Agricultural Experiment station 58:1287–1372, 10 text figs. and 14 pls. with 122 figs.
- STEINMANN, H. 1964. The *Chrysopa* species (Neuroptera) of Hungary. Annales Historico-Naturales Musei Nationalis Hungarici (Zoologica) 56:257–266, 1 fig.
- TAUBER, C. A. AND T. DE LEÓN. 2001. Systematics of green lacewings (Neuroptera: Chrysopidae): Larvae of *Ceraeochrysa* from Mexico. 94(2):197–209.
- TAUBER, C. A., T. DE LEÓN, N. D. PENNY, AND M. J. TAUBER. 2000. The Genus *Ceraeochrysa* (Neuroptera: Chrysopidae) of America north of Mexico: Larvae, adults, and comparative biology. Annals of the Entomological Society of America 93(6):1195–1221.

- TAUBER, M. J., C. A. TAUBER, K. M. DANNE, AND K. S. HAGEN. 2000. Commercialization of predators: Recent lessons from green lacewings (Neuroptera: Chrysopidae: *Chrysoperla*). *American Entomologist* 46(1):26–38.
- TJEDER, B. 1966. Neuroptera-Planipennis. The Lace-wings of Southern Africa. 5. Family Chrysopidae. Pp. 228–534 in *South American Animal Life*. B. Hanström, P. Brinck, and G. Rudebeck, eds. Vol. 12. Swedish Natural Science Research Council, Stockholm.
- WALKER, F. 1853. List [Catalogue] of the specimens of neuropterous insects in the collection of the British Museums. Part II. (Sialidae – Nemopterides). British Museum [Natural History], London. Pp. 193–476.
- WITHYCOMBE, C. L. 1923. Notes on the biology of some British Neuroptera (Planipennis). *Transactions of the Entomological Society of London* 1922:501–594, 6 pls. with 72 figs.